Chemical Age

PHENOL PRICE AGREEMENT ENDED

(page 641)

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16 April 1960

THE WEEKLY NEWSPAPER OF THE CHEMICAL INDUSTRY

INDEX TO ADVERTISERS

The first figures refer to advertisements in **Chemical Age Directory & Who's Who,** *the second to the current issue*

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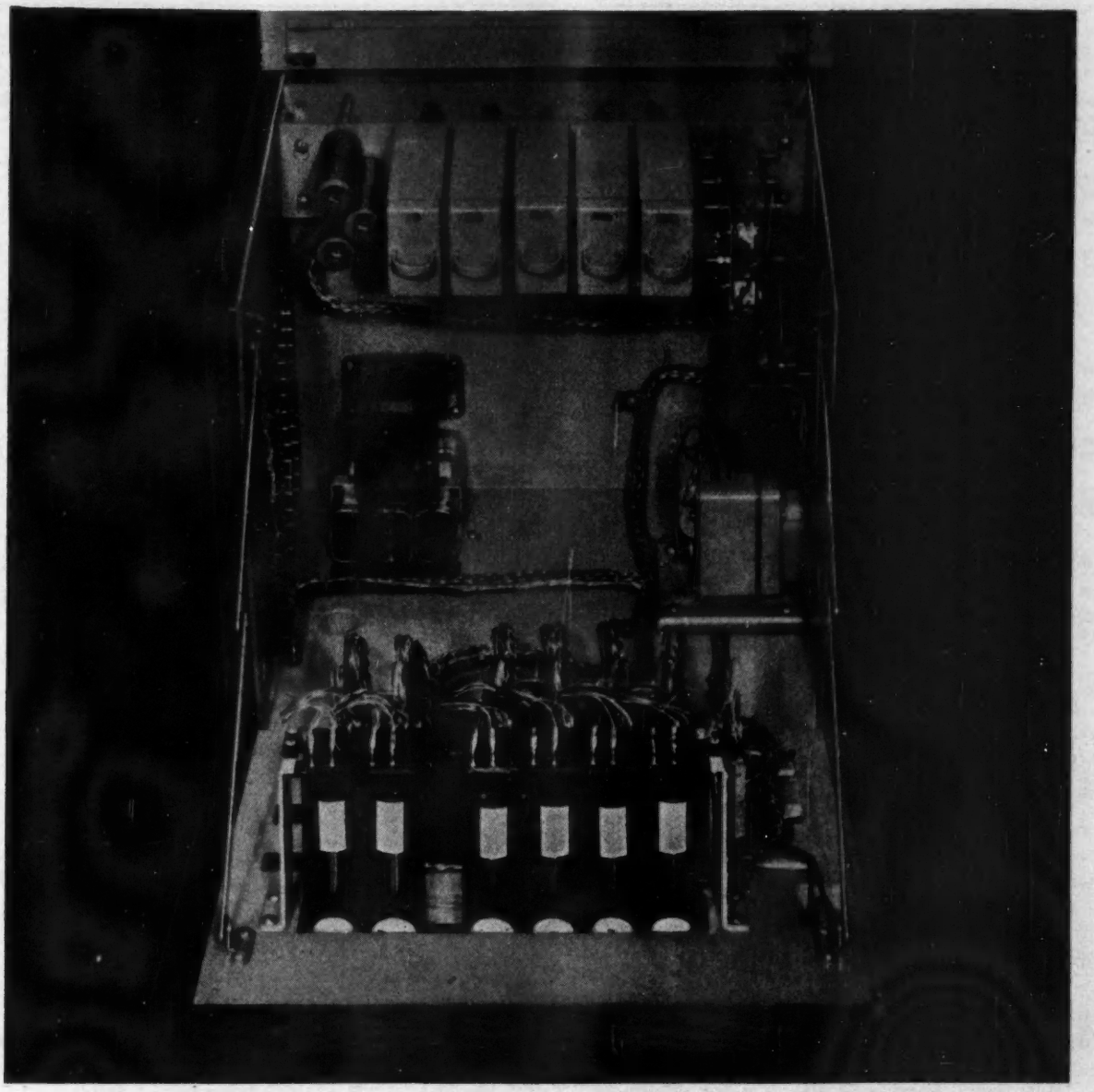

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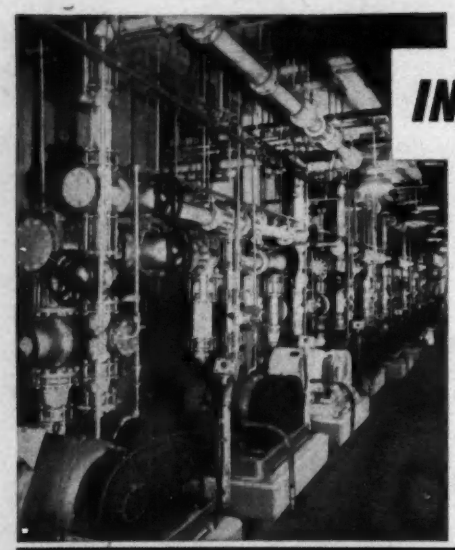

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Manager R. C. BENNETT
Director N. B. LIVINGSTONE WALLACE

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Daimler House, Paradise Street, Birmingham. [*Midland* 0784-5]

Leeds Office
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IN THIS ISSUE

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CHEMIST AND COMMUNITY

BRITAIN'S chemical industry has developed a keen 'community sense' undreamed of a century ago, not only in the way it spends vast sums to prevent annoyance to the surrounding district, but in the more positive contributions it makes to society; contributions that have also brought innumerable benefits on a purely local level.

Development of this attitude has been largely due to those farseeing chemists who before and after the first world war realised that their responsibilities were not only to the industry they served, but also to the country as a whole. As chemical plants get bigger and more complex, there is an even greater need for chemists to develop a community consciousness.

The relationship called for today between chemistry, industry and society was the subject last week of the presidential address of Mr. E. LeQ. Herbert at the annual meeting of the Royal Institute of Chemistry (see also p. 643). A chemist by training, Mr. Herbert is now managing director of Shell Refining Co. Ltd. and he drew on his experience in the petroleum industry to illustrate the theme of his address.

Not only is that industry firmly based on chemistry, but chemists have always ranked among its leaders. Few careers open to the modern chemist will bring him so soon face-to-face with this relationship between industry and society. Essential in its management is an understanding of world and local politics, of the balance of international trade, of economics and of many other things that might at first sight seem outside the province of the chemist as a professional man.

The chemist entering the petroleum industry inherits much accumulated wisdom and knowledge. A typical modern integrated refinery with substantial chemical plant will cost about £80 million. It employs about 4,500 people, of whom some 150 are qualified technical staff and some 50 or so are in management and executive positions. So about one in three of the graduates direct and regulate the work of others. That does not mean they cease to use their scientific training.

The plant manager, who is regularly using his chemistry to deal with day-to-day problems, might reach the highest position in the directorate, where ability to appreciate technical considerations is particularly needed. But technical knowledge is not enough—the aspirant will also be judged by the decisions he makes and how he explains them to his subordinates. In other words, by abilities that form no part of what is needed for a degree in science or technology. That is why the science student should have a subject that is not even remotely related to science, such as Latin, Hebrew or music. This will help broaden his field of judgment and make him abler than others to take on more 'other things' which he must do if he is to reach the top levels of management. In this context are such intrinsically non-technical considerations as understanding human nature, recognising justice and the art of getting on with people of all races.

This point has exercised the minds of other leaders of industry and Government. Among those who have urged science students not to neglect the humanities have been Lord Hailsham, Lord Chandos and Sir Alexander

Fleck. Credit is due to Mr. Herbert for stating the problem so clearly, particularly its effect on the chemist in his relations both with industry and the community. He does not, however, think that this approach should place any new burden on the universities. It is industry's duty to take on this broadening process by selecting, planning and helping the young man's career so as to develop the vital relationship between industry and society. By such means are the managers of the future produced.

The farther up the management tree the chemist climbs, the more varied will his responsibilities become. He may manage a refinery and here most of his time will be devoted to problems, inquiries and conferences. He must still know his chemistry, it is part of his job. But as Mr. Herbert pointed out, he must then do it through other people.

In considering the chemist and his position, Mr. Herbert looked beyond the refinery to the larger community of which it was a member. It might be sited in a remote region such as a desert, where there were no other industries; then suddenly wealth is created and modern life with all complexities springs into being. On the other hand, it might be needed in a large industrial area; then it might cause a readjustment in the old equilibria (social, financial and economic) of the district. Although a refinery might not employ many people itself, it will provide some local employment and it will encourage other industries which may well employ far more people. Even if the site is remote its isolation will not last long. Other industries will grow-up in the vicinity and the area may well become heavily populated.

In a new project such as a refinery, the chemist concerns himself first with the theoretical scheme that will provide new products, negotiating with a myriad of interests, turning the scheme into a practicable design, assisting in its construction, training locally recruited staff, bringing the plant into operation and then moving on to where his experience is in similar demand. Mr. Herbert used this summary to illustrate his reference to the 'other things' that the chemist needs in his make-up. Modern business is not merely manufacturing, buying and selling. It is analysing cause, deducing effect, using foresight, exercising judgment, taking responsibility. All this calls for imagination and those other higher faculties, the awakening of which in a scientist depends on a broad and liberal education.

The contribution that the chemist makes is not limited to his own country, for the drive to establish oil and chemical industries in less developed countries has brought new responsibilities. Mr. Herbert saw this as a repetition of an old pattern. Masters of special technologies—such as the Flemish weavers—brought to other lands not only their skills, which helped develop new industries, but also their ethics and inherited culture.

A great responsibility therefore lies on the scientist and technologist today in any consideration of how western technologies can best assist the emergent countries. Here, above all, says Mr. Herbert—and few will argue with him—the relation of professional ethics to industry and society must be acknowledged and used for good.

DEMAND FOR METHYL ETHYL KETONE

PLANNED entry of the third U.S. chemical company into the production of methyl ethyl ketone will raise capacity of a product that is already in oversupply in that country. Union Carbide Chemicals will make MEK at their newest—and eighth-plant at Brownsville, Texas, which is due on stream early next year. In addition to MEK, acetic acid, and acetic anhydride will also be produced.

Other U.S. manufacturers of MEK are Shell Chemical, with 160 million lb. capacity at Dominguez, Calif., and Houston, and Esso Standard Oil, who have facilities for 75 million lb. at Bayway, N.J. For the past few years, total production from these plants has been held at about the 200 million lb. mark.

Reports state that Union Carbide will be able to produce about 48 million lb. a year, using a similar process—dehydrogenation of secondary butyl alcohol—as Shell and Esso. (*Chem. and Engng. News*, 1960, **38**, No. 13, 33.) About 85% of total U.S. output is used in the surface coating industry; it is expected this year that about 70 million lb. will be used for nitrocellulose lacquers; a similar quantity for vinyl and polyvinylidene chloride (Saran) material; 35 million lb. for acrylic based lacquers; with the balance going for lubricating oil refining, adhesives, inks and exports.

There are two U.K. producers of MEK—Shell Chemical Co. with what is believed to be the largest output, and the Distillers' Company's Chemical Division with plant at Hull. As in the U.S., the process used is the dehydrogenation of secondary butyl alcohol, which is similar to that for the production of acetone from isopropyl alcohol—in fact both Shell and D.C.L. can use their plants for making either MEK or acetone.

Growth rate for demand in the U.K. for methyl ethyl ketone is said to be rising in about the same proportion as most of the petrochemicals. Demand for acetone is also growing, but perhaps not at the same rate. Uses in the U.K. follow the U.S. pattern, with surfaces coatings providing the main outlets, mainly for nitrocellulose lacquers. The second most important outlet is as a solvent for use in copolymers of p.v.c. and polyvinyl acetate. Other uses are in lube oil dewaxing, as a skinning agent in paints (methyl ethyl ketoxine). Increasing interest in polyvinylidine chloride (Saran) is seen as likely to raise U.K. demand in coming years.

EDC VERSUS ACETYLENE

NEWS that British Hydrocarbon Chemicals Ltd. are to construct an ethylene dichloride (EDC) plant at Grangemouth has focused attention on this chemical. In the U.S., EDC is linked with vinyl chloride and tetraethyl lead production (TEL). Vinyl chloride, used in p.v.c. production takes about 70% of production and TEL takes 20%; the remainder goes into ethylene diamine, solvents and fumigants.

The outlook for vinyl monomer production and TEL is bright. In 1958, vinyl monomer production in the U.S. totalled 691 million lb. (p.v.c. production in the U.K. was a little under 90,000 tons) and is expected to rise to about 900 million lb. to 1,000 million lb. by 1965. The picture regarding TEL is not so clear although in the U.K. consumption was reported at 19,151 long tons (see CHEMICAL AGE, 9 January, p. 78). In the U.S. TEL in aviation fuel has been showing a decline recently.

Vinyl chloride can be produced by two routes: from hydrochloric acid and acetylene which is the route favoured by British Geon; and by dehydrogenation of EDC which could well be used by British Geon when their new £2 million plant comes into operation some time in 1961. In the U.S. the acetylene-HCl route is the most popular but a definite trend towards EDC is indicated at present. Some consider that this trend may be reversed, however, when ethylene, at present a cheap material compared with acetylene, becomes more difficult to obtain. In the U.S., in any case, a combination of the two processes is used. As is believed may be the case with British Geon, EDC is dehydrogenated giving hydrochloric acid as a by-product. The acid is then reacted with acetylene, to get more vinyl chloride. In fact, in the U.S. about 10 to 15% of EDC produced is used captively.

Restrictive Practices Court Declares Phenol Price Agreement Against 'the Public Interest'

RESTRICTIONS contained in the price fixing agreement between members of the Phenol Producers' Association were declared contrary to the public interest by the Restrictive Practices Court in London on 7 April. On behalf of the association, Mr. D. A. Grant undertook not to enforce the agreement or to enter into any new agreement without informing the Registrar of Restrictive Trading Agreements.

The Court's decision was given by Mr. Justice Pearson, who said that the association had 15 members at the start of the proceedings, but one had since resigned. Among the 14 members are a number of area Gas Boards. Total production of synthetic phenol was expected to be 39,000 tons in 1960, rising to 42,000 tons in 1961 and after, two-thirds of which would be produced by non-members of the association. Production of natural phenol appeared to be 14,000 to 15,000 tons a year from coal tar.

The P.P.A. price for phenol (1s 4d/lb. at present) was not fixed by reference to production costs. The secretary of the P.P.A. agreed in his evidence that the real factor in fixing the price was the gauging of what price the trade would stand. The chairman, when asked whether the system was "opportunism tempered by a collective sense of caution", replied "That puts it very nicely."

Price Levels

In January 1947 the price was 10½d/lb.; in July 1950 it was raised to 11½d; in January 1951 to 1s 1d; in July 1951 to 1s 6d, at which level it remained until July 1953, when it was reduced to 1s 4d/lb. It had remained at that price ever since and full credit must be given to the association for keeping the price steady in a period of inflation. In July 1951 phenol was being imported at prices of 5s/lb. But by June 1952 at the latest the shortage had disappeared and a surplus was anticipated. Despite complaints from some customers and the dissent of some members, the price stayed at 1s 6d until July 1953.

Whether or not the price of 1s 6d in 1951 was immoderate, the Court was satisfied that it had been artificially held at too high a level after June 1952.

The evidence disclosed four main trends about the industry at present:

1. There was rapid and consistently rising production. In 1960 output would be four times the 1949 level.
2. Imports had died away.
3. Home trade deliveries had risen remarkably though not as much as production.
4. Exports, non-existent in 1949, had become an increasingly large outlet.

Although figures were not exactly comparable, it seemed clear that the fixed price of 1s 4d per lb. was above the current world price as shown by German and U.S. domestic prices. It was higher than the price at which large sales of phenol had been made by certain synthetic producers who were not members of the association.

In the Court's view there were four main detriments of the scheme:

1. The fixed price was above the price which would be obtained in a free market.
2. It was not related to costs of production, but was left to the unfettered discretion of members.
3. Policy had been "to charge what the traffic would bear." Customers' interests were regarded because the producers did not wish to spoil their market by charging too high prices; but the dominant object was to secure a good return for the producers.
4. There were no concessions to the export trade, or for long-term contracts or bulk orders. Customers whose premises were a mile from the works paid as much as those hundreds of miles away. Those who collected their own phenol in their own transport, had to pay the same price as those who did not.

Detriments to Public

Prima facie all those four main features of the scheme were not benefits or advantages, but detriments to the public. Removal of the restrictions would not deny to the public any benefit or advantage, but would relieve them of detriments.

The P.P.A. had sought to meet those detriments by saying that if the scheme were abolished there would be large diversion from distillation to burning as fuel. The contention was based on the proposition that there was now a surplus of supply over demand which would last five years, after which there would be a shortage. It was also stated that a free market would mean a cut in the price of phenol from 1s 4d to 1s per lb. and that would so reduce the revenues of tar producers that they would divert from distillation to burning tar acids as fuel with the result that the chemicals derived from tar distillation would be lost to the nation.

The court, could not accept those contentions. There was no evidence of any world-wide excess of supply over demand and the association could probably export much of its surplus production. There was unlikely to be a shortage in five years time because the synthetic producers would be able to expand their production.

The price of phenol was most likely to fall on a free market, but owing to the present level of export prices, which were above 1s/lb., it was not likely to fall by as much as 4d per lb. Lower prices could generate new uses and demand.

Even assuming, however, that these consequences would occur, it did not follow that there would be diversion to fuel. Expert opinion conflicted as to the suitability of tar as a fuel and there was the uncertainty of the oil market, and the great difficulties involved in competing with oil.

The association alleged that diversion of tar would result in the products being permanently lost, thus denying an advantage to the public. The Court have confirmed its view made when considering the yarn spinners' agreement. As a general rule price stabilisation as an alternative to a free market was not a benefit to the consuming public. "Stabilisation does not appear to us to be necessarily a virtue.

It was also contended that the price control system had ensured an increasing supply of phenol to meet an erratically increasing demand and that continuance of the system gave the best security that the future supply of phenol would be in line with future demand.

The Court said: "In our view that is claiming too much for the effect of the price-fixing scheme. The effective reason for the increase in supply has been the rapid and on the whole steady increase in the demand for phenol, especially for the growing plastics industry. Two of the large synthetic producers are outside the association and are making at any rate some sale below the fixed price."

The chairman of the Eastern Gas Board had said that even if the price of phenol fell to 1s/lb. for a period of five years, that would not be a sufficient loss in revenue to induce the board to divert their tar from distillation to burning as a fuel. That was the only evidence given by a tar producer.

Accepting that evidence and taking all the factors into account, the Court was not satisfied that there would be the diversion on which the association had relied. They had therefore failed to prove their case; accordingly, a declaration would be made that the restrictions were contrary to the public interest.

I.C.I. to Make Ammonia on Severnside

ANOTHER extension, additional to that referred to in the 19 March issue of CHEMICAL AGE, p. 489, is announced for the methanol plant of the I.C.I. Heysham Works, where capacity was recently raised by 30,000 tons a year. The new facilities will raise this a further 45,000 tons. (Total production has not been disclosed). Engineering will be handled by the company.

A new ammonia plant, with a capacity of 100,000 tons a year is also announced together with associated plants to make urea and fertilisers, for the Severnside works of the company, at a cost of some £10 million. Both plants are expected to be on stream during 1962. It is understood that construction contracts have yet to be awarded. Both the methanol and ammonia plants will come under the Billingham Division.

In the 26 March issue of this journal it was noted that British Hydrocarbon Chemicals Ltd. are to embark on construction of a methanol plant as part of their £5 million expansion programme.

★ "A UNIQUE address" was how Dr. D. W. Kent-Jones described the presidential address of Mr. E. Le Q. Herbert (Shell Refining), presented at the annual meeting of the Royal Institute of Chemistry in Belfast last week. Mr. Herbert's talk dealt with the chemist and his position in relation to industry and the community.

The address was accompanied by many slides, coloured and otherwise, of refineries and petrochemical plants. High lights were a piece of animated colour film specially produced for the occasion, depicting growth of world oil production, and excerpts of a film made some years ago showing construction of the Stanlow refinery. Rehearsals and first-class timing by the projection operator, helped make this "a unique address".

Equally noteworthy was the presidential address of Professor H. Emeléus, retiring president of the Chemical Society, given on the following day of the joint annual meetings of the two organisations. Like many of his audience, I can claim no special knowledge in the field of fluorine chemistry. But the professor in describing recent advances here, showed his mastery of a subject in which he has become a world authority.

★ THE two presidents were also in the news so far as the local Press was concerned. Mr. Herbert's visit to Northern Ireland coincided with the news that Shell and B.P. are planning a new refinery in Ulster, as reported in 'Project News' last week. Not much more could be said of this for the site has yet to be chosen.

Professor Emeléus was able to meet his distinguished brother who apart from being Professor of Physics at Queen's University where the meetings were held, is also adviser to the Governor of Northern Ireland on nuclear energy.

That the joint meetings were voted such a big success with a record attendance of more than 650 was largely due to the work of the local organising committee, headed by Dr. A. J. Howard, head of the Forensic Laboratory, and Dr. R. J. Magee, lecturer in organic chemistry at Q.U.B. Equally, of course, months of hard work were put in by the secretariats of the two organisations. In any event, those attending, including myself, will remember the event for a long time to come.

★ SODIUM pentachlorphenate in the House of Lords—the news might almost have made a nice heading for the pages of a journal such as CHEMICAL AGE, in large type; and the Robinson Waxed Paper Co. Ltd., of Fishponds, Bristol, are to be congratulated on having penetrated the august precincts of the Upper House on behalf of the chemical industry.

Valuable documents and records there are now being preserved in a wrapping paper and interleaved with a special fungicide-impregnated tissue which has over the past few years been extremely successful in treatment of documents which are fungus prone, or are stored in damp conditions.

House of Lords staff are actually reported to have developed a small winding machine for long rolls of parchment, enabling lengths of the impregnated tissue up to 100 yards in length to be wound into such scrolls, to ensure their handing down to posterity.

★ PLANT worth many thousands of pounds, and the production that makes that expenditure worth while, frequently depends on the proper operation of one small item which can fit into the palm of a hand—a bursting disc. That these can now be regarded as precision instruments is to a great measure due to the research work that the Distillers Company Ltd. have carried on for some years.

The need to protect their own equipment prompted D.C.L. to undertake this work. Now of course, the benefit of their accumulated research know-how is available to other chemical companies for they manufacture a range of stanard bursting discs not only for their own use, but also for supply to industry at home and abroad.

The D.C.L. research work on bursting discs, with many of the results achieved, is fully described in *Wiggin Nickel Alloys*, No. 55, published by Henry Wiggin and Co. Ltd., Wiggin Street, Birmingham 16.

★ I WAS interested to read in a recent paper by Dr. A. J. Martin of the Metallurgy Division, Atomic Weapons Research Establishment, Aldermaston, that of the three main factors militating against the widespread use of beryllium in industry—cost, low room-temperature ductility and toxicity—that he considered toxicity the least important. In his paper, 'Beryllium as a structural material' (*Atom*, March), Dr. Martin said that the handling problems had often been exaggerated.

Beryllium is toxic in finely divided form and quite small airborne concentrations of the metal or its compounds can present a physiological hazard. Dangers also exist during machining solid beryllium metal or if the metal becomes heavily oxidised as in a major fire, where the oxide becomes airborne. In that case, the fire would present a greater hazard than any resulting airborne beryllium contamination.

The deterrent effect of the metal's toxicity is seen as economic rather than physiological. The cost of fabricated titanium products was some five to six times that of the basic raw material; the cost of providing toxic control in the production of beryllium metal in fabrication and machining, might increase that ratio by "an order of magnitude", said Dr. Martin. He believes that successful completion of work on beryllium alloys for creep resistance, on fabrication methods and on producing reliable, consistent sheets or other shapes that can be formed at or slightly above room temperature, will lead to an assured future of the beryllium industry.

★ ATTEMPTS to use solar ultra-violet radiation virtually as a catalyst in the production of nitrate fertilisers are being carried out at the solar energy laboratory operated by the University of Algiers, using — according to a U.N.E.S.C.O. report — air and water as raw materials. Almost, if not quite, without crossing the frontiers of science fiction, it is plausible to envisage solar factories sited in the Atlas Mountains and in the Sahara Desert which would produce fertilisers for cultivation schemes in arid regions.

Although no immediate and spectacular drop in fertiliser shares need be feared on the home market as a result, it is a fact that experiments with a 27-foot steerable mirror have produced fertilisers "which may eventually be cheap enough to compete with other fertilisers", while manufacture of other chemicals is also under study.

★ THOSE who have followed recent cases in the Restrictive Practices Court could not have doubted the outcome of the hearing on the phenol price agreement, which last week was stated to be against the public interest (see p. 641).

The view expressed at the Court that if phenol prices fell to 1s per lb., tar distillers would have to divert tar to burning as a fuel, with a consequent of valuable chemical materials, was not accepted. The Court accepted the evidence of the chairman of the Eastern Gas Board, that even if the price fell to 1s for five years, the loss of revenue would not be enough to induce the board to switch from distillation to usage as a fuel.

I am told that at least two of the synthetic phenol producers are sold well ahead—one to the end of the year. It seems most unlikely, therefore, particularly with the current high demand for phenol, that prices will fall on a free market, at least not for some time.

Alembic

C.S.–R.I.C. ANNUAL MEETINGS A NOTABLE SUCCESS

Record Attendance of 650 at Belfast

WITH an attendance of more than 650 members and their wives, the joint annual meetings of the Chemical Society and the Royal Institute of Chemistry, held for the first time in Belfast last week, were a notable success, both socially and in the quality of the papers that were presented.

The joint meetings had as their setting the magnificent new David Kier building which houses the Chemistry Department of the Queen's University of Belfast. They started on Tuesday, 5 April, and ended on Friday, 8 April, with a reception and dance held by Imperial Chemical Industries Ltd. in the Sir William Whitla Hall.

Outstanding features of the joint event were the two presidential addresses and the joint annual dinner held on 6 April, also in the Sir William Whitla Hall.

The president of the Royal Institute of Chemistry, Mr. E. LeQ. Herbert (managing director of Shell Refinery Co. Ltd.), whose term of office expires next year, chose as his theme 'Chemistry, industry and society'. His talk was accompanied by slides and film. Professor H. J. Emeléus, C.B.E., F.R.S., president of the Chemical Society and Professor of Inorganic Chemistry, Cambridge University, spoke on 'Some recent advances in fluorine chemistry', a subject in which he is an acknowledged expert. He is succeeded as president by Sir Alexander Todd, F.R.S., Professor of Organic Chemistry, Cambridge University.

On 5 April, members and ladies were welcomed by the City of Belfast at a civic reception in the City Hall. A reception was held by the Northern Ireland Government at the Parliament Building, Stormont, on 7 April. Among the visits were those to United Chrometanners Ltd., Killyleagh, Co. Down, the Linen Industry Research Association, Lisburn, Co. Antrim, Gallaher Ltd., Belfast 15, Associated Electrical Industries Ltd., Larne, Co. Antrim, Stevenson and Son Ltd., Dungannon, Co. Tyrone, and Chemstrand Ltd., Coleraine, Co. Londonderry.

Papers were presented as follows: 'Ommochromes, new natural pigments, their biogenesis and physiological importance' by Prof. A. Butenandt, Max Planck Institute, Munich (Sir Alexander Todd in the chair); 'Some aspects of acetylene-allene chemistry', by Prof. E. R. H. Jones, Oxford (Prof. R. A. Raphael in the chair); 'Ion pairs in solvolysis and exchange', by Prof. S. Winstein, California University (Prof. H. B. Henbest in the chair).

'Metastable protonation and deprotonation products in aqueous solution', by Prof. C. Scharzenbach, Eidgenösische Technische Hochschule, Zurich (Prof. C. L. Wilson in the chair); 'Some modern developments in the study of heterogeneous catalysis', by Prof. G. M. Schwab, Munich University (Prof. C. Kemball in the chair).

Other functions included a meeting of C.S. local representatives and a conference of hon. secretaries of R.I.C. local sections.

See also pages 639 and 642.

Chemistry, Industry and Society

THE role of the chemist and his position in industry and responsibilities to the community were the subject of the presidential address of the Royal Institute of Chemistry, given by Mr. E. LeQ. Herbert, managing director of Shell Refining Co. Ltd., at the annual meeting in Belfast on 5 April, under the title 'Chemistry, industry and society'.

Mr. Herbert said that not only had chemists always ranked among the leaders of the petroleum industry, but the industry, wherever it went, had a profound effect on society. There were few careers that brought the chemist so soon face to face with the theme of his address—industry and society. His remarks on the relationship of the chemist with the community are referred to in p. 639.

He also dealt with the contribution that the chemist made to the petroleum industry and outlined refinery processes. Mr. Herbert described as "one of the most interesting and far-reaching of the more recent developments", the growth of the petrochemicals industry. Although this was now a major chemical industry in its own right, there was still a strong family likeness between the two. The products were still made in much the same way that a petroleum refiner would make them and the plant had the same rather neat arrangement and general layout developed by the oil-refining industry.

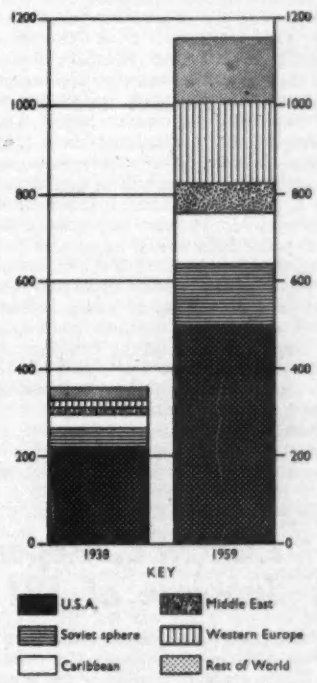
The oil industry had long used alkylation of isobutane with butylene to make iso-octane, but if instead of isobutane and butylene it used benzene and propylene, then the result was cumene and some di-isopropyl benzene. Chief application of cumene was as an intermediate; it would, for instance, form a peroxide, which in dilute mineral acid broke down into phenol and acetone.

E. LeQ. Herbert, R.I.C. President

Di-isopropyl benzene was an intermediate for further synthesis and could, for instance, be oxidised to the phthalic acid.

Operation of propylene and benzene was the same as for butylene and isobutane, except for a higher plant pressure and perhaps one extra column and some adjustment of flows, temperatures and acid strength. Even the expert visitor would find it hard to say whether such a plant was making either iso-octane, or di-isopropyl benzene or cumene.

World Crude Refining Capacity
Million Tonnes a Year



The other route to cumene by vapour-phase reaction over phosphoric acid in kieselguhr, was also a petroleum process in origin, having first been used for polymerisation of butylene to iso-octane. These aspects showed how nearly petroleum refining could approach the heavy organic chemicals industry, where it would at once be conceded the chemist held sway.

Mr. Herbert then referred to the trend in recent years to build refineries in consumer countries, influenced by the acute shortage of refining capacity, the fact that skilled labour was readily available, the shock of Abadan in 1951 which underlined the vulnerability of the large all-purpose refinery sited far from home and relying on one source of crude only, the growth in size and speed of tankers, and the demands of some governments to have a refinery almost irrespective of the precise balance of economic advantage it would bring.

C.S.-R.I.C. Annual Dinner Held at Queen's University Belfast

MORE than 450 members, ladies and guests packed the Sir William Whitla Hall of Queen's University, Belfast, on 6 April, for the joint annual dinner of the Chemical Society and Royal Institute of Chemistry. They were received by Mr. E. Le Q. Herbert, R.I.C. president, who presided, and Mrs. Herbert, and Professor H. J. Emeléus, C.S. president, and Mrs. Emeléus.

Proposing the toast of 'The Society and the Institute', Lord Glentoran, Minister of Commerce, Northern Ireland, said that every year saw new applications in the field of chemistry for the service of mankind and new opportunities opened for the professional chemist. He stressed that the Ulster Government welcomed new industries and in fact already had a number of chemical factories. He welcomed Mr. Herbert to Northern Ireland, particularly in his capacity as managing director of Shell Refining, whose parent company was doing a great deal towards the planning of a new refinery, which would be a welcome addition to the chemical plants of the Province.

Responding to the toast, Mr. Herbert said that their first joint annual meetings were held in Dublin in 1952, and it was tremendously encouraging that on the present occasion they should have such a good attendance. Sir Eric Rideal, the C.S. president, had presided at the Dublin dinner.

Toast of 'The Guests' was proposed by Professor Emeléus. who particularly welcomed the ladies. The organising committee, chaired by Dr. A. J. Howard, director of the Belfast Forensic Laboratory, and with Dr. R. Magee, of Queen's University, as hon. secretary, had done a magnificent job. He also welcomed the visiting lecturers, some of whom came from overseas, heads of other societies, and representatives of Government and industry.

Replies were made by Alderman R. G. C. Kinahan, Lord Mayor of Belfast, and Professor M. Grant, vice-chancellor of Queen's University. Mr. Kinahan hoped that chemists would help in the development of a cheaper fuel which would enable goods to be made cheaper. He also spoke of the desirability of direct imports to Ulster of liquid methane.

Those present included: Dr. D. O. Tuama, president, Institute of Chemistry of Ireland, Sir Frank Montgomery, Pro-chancellor, Q.U.B., Dr. A. K. Mills, vice-president, Society of Chemical Industry, Councillor J. G. Colhoun, Mayor of Londonderry, Mr. J. E. Forde, president, Belfast Chamber of Commerce, Professor H. G. Lamont, chief scientific officer, N.I. Ministry of Agriculture, Mr. R. C. Chirnside, president, Society for Analytical Chemistry, Dr. J. P. Dickson, I.C.I., and Dr. R. F. Goldstein, managing director, British Oxygen Chemicals Ltd.

I.Chem.E. Reports Net Membership Increase of 591 at Annual Meeting

A NET increase in membership of 591 to 4,872 of the Institution of Chemical Engineers was reported at the annual meeting on Tuesday. This was an increase of 13.8% compared with 11.9% in 1958.

Pending completion of the first phase of the panel of moderators work, the existing system for the recognition of courses operated throughout the year and courses are now recognised at Battersea College of Technology, Glamorgan College of Technology, Heriot Watt College, Salford Royal Technical College, and West Ham College of Technology.

Mr. A. H. Isaac had represented the Institution at a meeting of the European Federation of Chemical Engineering to consider setting up for a limited period a working party on process automation. Mr. A. S. D. Barrett was nominated to represent the I.Chem.E. on a proposed working party on vacuum technology, while Professors P. V. Danckwerts and K. G. Denbigh were nominated for a working party on chemical reaction engineering.

Plans were being worked out for a visit by a small Soviet party to the U.K. chemical and chemical plant industry. Progress was made possible by the co-operation of the Association of British Chemical Manufacturers and the British Chemical Plant Manufacturers' Association.

After the annual meeting, Mr. W. K. Hutchison, C.B.E., president, gave his presidential address on 'Fuel and power: a technological approach'.

At the annual dinner, held in the Park Lane Hotel, London, Mr. Hutchison and Mrs. Hutchison received 400 members and guests. The toast of the institution was proposed by Mr. Richard Wood, Minister of Power, and replied to by Mr. Hutchison, who also proposed the toast 'Our guests'. Sir Cyril Hinshelwood, president, Royal Society, responded.

W. K. Hutchison, I.Chem.E. president

Mr. Hutchison, referring to the gracious replies to loyal messages which had been sent to The Queen and to the Instiution's Royal Patron, Duke of Edinburgh, said the Duke had commented that the importance of chemical engineering to this country and to the Commonwealth was growing every year.

Membership of the council is now: *President*, W. K. Hutchison (deputy-chairman, Gas Council); *vice-presidents*, C. M. Auty (consultant), Prof. M. E. J. Cathala (Institut du Genie Chimique, Toulouse, re-elected), E. Le Q. Herbert (Shell Refining Co. Ltd., and president, Royal Institute of Chemistry, re-elected) and K. B. Ross (Industrial Group, A.E.A.); *joint hon. secretaries*, F. E. Warner (Cremer and Warner), R. C. Odhams (Constructors John Brown Ltd.); *hon. treasurer*, F. A. Greene; *council (members)*, S. W. Adey, A. P. Buchanan, W. J. Chadder, Prof. P. V. Danckwerts, E. W. Greensmith, Dr. B. Raistrick, R. W. Rutherford, Dr. J. A. Storrow, C. S. Windebank; *associate members*, W. G. Daroux, A. H. Isaac, P. A. Rottenburg; *co-opted members*, K. M. Curwen, G. U. Hopton, Prof. F. Morton, W. M. Neale-May, A. S. White.

I.Chem.E. Revise Conditions of Admission

REVISIONS mainly concerned with the definition of qualifications which may carry exemption from the membership examination have been drawn up by the Institution of Chemical Engineers.

New basis for complete exemption from such examination is the satisfactory completion of an honours degree course for a first degree in chemical engineering of a British university. Many who were previously required to take parts 3 and 4 for promotion to associate membership are now exempt from the whole examination, but will still have to comply with other requirements for such promotion.

New U.K. Nylon Works Will Compete with B.N.S.

THE large Netherlands manufacturers of rayon and synthetic yarns and staples, Algemene Kunstzijde Unie N.V. (A.K.U.), in a brief announcement of plans to manufacture in the U.K. in collaboration with their U.K. associate British Enka Ltd., have introduced the first note of active competition into the British nylon market.

Plans for the U.K. factory, to produce nylon yarn and nylon plastics materials, are said to be advanced, though further details are still pending at time of writing.

British Nylon Spinners in 1956 granted licences to British Enka to produce Nylon 6, which have been successfully exploited in manufacturing units in the Netherlands, Germany, Italy and the U.S. Licences were also granted to British Celanese.

It is considered likely that the new move may force the hand of British Celanese (a Courtaulds' subsidiary), who have initiated work on a Nylon 6 yarn and achieved an advanced stage of development—though no sales have yet been made to producers.

New Semiconductor Devices

Details of 11 new series of transistors, rectifiers and resistors now being introduced by Texas Instruments Ltd. are available from the company at Dallas Road, Bedford.

Monsanto Investors 'Tour' Works with Chairman

SIR MILES THOMAS, chairman of Monsanto Chemicals Ltd., told shareholders at the annual general meeting in London on Monday that results for the first quarter of the current year were even better than in the comparable quarter of last year. Several hundred shareholders who were present had accepted an invitation to accompany Sir Miles on a personally conducted tour of Monsanto's three factories with the help of 3-D colour slides. Shareholders saw the pictures through special glasses and heard a commentary by Sir Miles. Because of the large attendance, two shows were needed.

Sir Miles pointed out that the only contact most shareholders had with their companies was the twice yearly dividend and an annual report. Their conducted tour, he hoped, would establish a more personal contact with those who invested in the company.

Stress-relieving of Large Vessels

STRESS-RELIEVING of large cylindrical vessels without the use of a furnace, was demonstrated at the "Gas at work in industry" exhibition staged by the North Eastern and Northern Gas Boards at Harrogate from 28 March to 1 April. The technique involved has been developed by the North Eastern Board with Clayton Son and Co., of Leeds.

A one-sixth scale model was shown and on each day of the exhibition a single burner of the latest design was seen stress-relieving a vessel. With the model was the actual burner equipment for processing a vessel 48 ft by 9 ft

Further development in the handling of awkward shapes, and the possibility of enlarging the scope of the method to that of high temperatures in the order of 1,000°C, were shown by flow model.

Toxic Substances in Factory Atmospheres

MEASURES for the protection of workers against the inhalation of dusts or fumes or other impurities likely to be injurious are discussed in a new booklet *Toxic Substances in Factory Atmospheres* published by the Ministry of Labour, available from the Stationery Office, London W.C.2, price 1s. The booklet is the latest in a series designed to give information and advice about questions of safety, health and welfare in industry.

Some hazards and the proper precautions against them are well known, but with the increasing complexity of industrial processes new substances are coming into use. The first step in all cases is to know what substances are being used, and the possible hazards involved. The booklet gives figures of maximum permissible concentrations of certain substances as a guide to which the efficiency of control measures should be related. These figures are subject to revision in the light of increasing knowledge. Amendments to the list will be published from time to time.

U.S. Polydiene Rubbers to be Sold in U.K. by Durham

TWO new U.S. synthetic rubbers—polyisoprene and *cis*-polybutadiene—are to be marketed in the U.K. by Durham Raw Materials Ltd., 1-4 Great Tower Street, London E.C.3. The producers, Goodrich Gulf-Chemicals Inc., Cleveland, Ohio, as stated in CHEMICAL AGE, 20 February, p. 329, are to make these products on a plant with an annual capacity of about 25,000 tons, which should be on stream by the end of this year. Testing and evaluation samples are available now.

Shell Chemical are also to make polydiene rubbers in the U.K., while Shell Nederland N.V. are to make them in Holland. (CHEMICAL AGE, 2 April, p. 562), Shell Chemical in the U.S. decided last year to set up a 15,000-20,000 tons/year polyisoprene plant (C.A., 30 May, 1959, p. 888) and Phillips Chemical expect to complete a 20,000 polybutadiene plant by August this year and now have available high *trans*-polybutadiene (see p. 653).

The two products to be distributed by Durham Raw Materials, Ameripol SN rubber (polyisoprene) and Ameripol CB rubber (*cis*-polybutadiene) will be produced interchangeably in the same plant. Ameripol SN is said to be the first synthetic rubber with the same molecular structure as natural rubber, possessing the same physical properties, even to tack and stickiness. It has been produced in five distinct types in tonnage quantities for large-scale testing. Tests have shown that the product can be substituted lb.-for-lb. for natural rubber in truck, bus, aeroplane, military and off-the-road tyres.

Ameripol CB rubber is said to minimise heat build-up, a prime cause of the destruction of truck tyres and other rubber products. It is also claimed to be a stronger, tougher rubber at high temperatures than any other general-purpose synthetic rubber now available. It has higher rebound characteristics than natural rubber, while road tests of tyres containing 25-90% Ameripol CB indicate both improved tread wear and softer, easier and quieter riding characteristics.

In addition to the ability of the new rubbers to resist heat build-up—the chief reason for continued extensive use of natural rubber in heavy duty tyres—they have abrasion-resistant qualities which hold promise of greater tyre mileage and longer tyre life.

Principal ingredient of Ameripol CB rubber is butadiene and Goodrich-Gulf have an annual butadiene capacity of 150,000 tons. Main raw material for Ameripol SN, isoprene, will soon be available from U.S. sources in sufficient quantities to back the commercial production of the rubber.

Durham Will Also Sell Dutch Rubbers

THE range of synthetic rubbers now in production by N.V. Chemische Industrie A.K.U.-Goodrich will also be handled in the U.K. by Durham Raw Materials Ltd., 1-4 Great Tower Street, London E.C.3. To be sold under the trade name Ciago, these rubbers comprise nitrile latices, S.B.R. latices and high styrene resins.

A.K.U.-Goodrich started manufacturing operations at Arnhem, Holland, in September last and are at present working to full capacity. Already considerable plant extensions are under way.

The Queen and Duke To Take Part in Royal Society Celebrations

IT has been announced from Buckingham Palace that both the Queen and the Duke of Edinburgh have consented to take part in the Tercentenary Celebrations of the Royal Society, to commence on 18 July this year.

Her Majesty will open the Celebrations at a formal ceremony in the Royal Albert Hall on the afternoon of Tuesday, 19 July, and will be accompanied by the Duke of Edinburgh, and also by the Society's president, Sir Cyril Hinshelwood, Professor of Chemistry, Oxford, who will deliver the tercentenary address.

Obituary

Dr. Charles James Still, of Belfast, a founder member of the Faculty of Applied Science and Technology of Queen's University, Belfast, aged 81. Dr. Still, who retired in 1944, came to the Belfast College of Technology in 1902 as a laboratory assistant, after serving his apprenticeship to a pharmacist.

1960 will be Record Fertiliser Year

THERE will undoubtedly be more fertiliser sold in this country this year up to June than ever before, said Mr. W. J. V. Ward, chairman of I.C.I. Billingham Division, speaking at a recent long-service function. "And," he added, "I.C.I. will take its share of the market." Although there is an ever-increasing fertiliser demand in the U.K. due to advances in agriculture, the company is facing keen competition. Fertilisers account for some two-thirds of the total sales of the Division.

The market in Northern Ireland has expanded rapidly in the past few years, and it was to help met this demand that the company had acquired a majority share in two N. Ireland fertiliser companies. It is intended to build a "very substantial plant there" which should be producing by 1962.

Mr. Ward also referred to the increase in the company's share value from 38s to 63s last year, and to the amount to be distributed through the profit sharing scheme to employees, which has advanced from £5.4 million to £7.1 million.

NEW DU PONT POLYFUNCTIONAL ACID INTERMEDIATES FROM DURHAM RAW MATERIALS

NEW and useful additions to the growing list of polyfunctional acid intermediates for polyesters, polyamides and many other products of the polymer and resin industries are pyromellitic acid (1,2,4,5-benzenetetracarboxylic acid), or PMA, and its dianhydride (PMDA). They are du Pont products, available in the U.K. from Durham Raw Materials Ltd., Great Tower Street, London E.C.3.

Both PMA and PMDA are highly reactive, relatively stable compounds which undergo many of the reactions typical of the carboxyl group. Their symmetrical, tetrafunctional, aromatic structure should prove exceptionally versatile in a wide variety of uses where poly-basic acids are required. Because of their unusual functionality, they offer opportunities for use in novel cross-linking reactions, preparation of multi-substituted derivatives, and new polymer configurations. Their substitution for acid intermediates in existing applications provides a means of obtaining interesting and useful product modifications.

In addition to the following potential applications, the possible uses of various PMA and PMDA derivatives include synthetic lubricants, paper sizes, high-melting water-resistant greases, emulsifying agents and corrosion inhibitors.

As a Curing Agent for Epoxy Resins. Epoxy resins can be cured with organic anhydrides to give castings with a number of exceptional properties. The addition of PMDA to these anhydride curing agent systems has been shown to provide significant improvements in the chemical, electrical and physical properties of finished resins, particularly at elevated temperatures. For example, combinations of PMDA and maleic anhydride give heat distortion temperatures as high as 280°C.

Glycol Adducts

A curing system employing PMDA and tetra hydrofurfuyl alcohol (THFA) permits an extremely short cure—15 minutes at 180°C—and gives a cured resin with the same outstanding high-temperature properties and moderately better overall room temperature properties.

Because PMDA has a high melting point and limited solubility in common organic solvents, derivatives of the material have been prepared which will impart desirable properties to cured resins yet also have lower melting points, improved compatibility with resin ingredients, and improved solubility in common solvents. These derivatives, known as 'PMDA-glycol adducts', were prepared by the reaction of two molecules of PMDA with one molecule of a glycol in a ketone solvent. The use of these adducts has given coatings with excellent hardness, flexibility, impact resistance, and adhesion to panels of cold rolled steel and aluminium which had not been etched or primed. The chemical resistance of the coating on Bonderite 1000-treated 24-gauge steel was also stated to be excellent.

In applications where pot-life is critical, shelf-life can be extended considerably by compounding PMDA with a solid epoxy resin, or preparing a solid pre-polymer with a liquid epoxy resin.

Rigid Vinyl Plastisuls. PMDA can be used to cross-link epoxy plasticisers, such as epoxidised soybean oil, in fluid p.v.c. resin plastisols to produce fused products which are tough and rigid.

An outstanding feature of these modified plastisols is the ease with which properties of the finished products can be controlled merely by varying the amount of PMDA and plasticiser. For example, products can be obtained which have better heat resistance than conventional rigid vinyls, good electrical properties, good chemical and solvent resistance, and good abrasion resistance. Plastisols may be formulated which exhibit very good adhesion to various primed substances, and the more rigid formulations will even develop good adhesion to unprimed surfaces.

The plastisols can be used for coating, casting and moulding applications. Smooth, tack-free coatings can be applied readily by conventional dip, spray, and spread methods. Also, rigid reinforced sheets can be prepared readily from these plastisols and glass cloth, glass mat, or 'Dacron' mat.

In Alkyd Resins and Polyesters. By the use of PMA it is possible to make significant changes in the acid functionality of alkyd resin systems. A long oil alkyd containing PMA and phthalic anhydride as the acid components gave clear films which were faster drying and slightly more resistant to cold water, 1% alkali and petroleum than were films of a commercial pentaerythrityl phthalate resin of similar oil length. A short oil PMA resin gave a film "definitely superior in hardness, and in resistance to cold water, 1% alkali and petroleum, as compared with a commercial short oil phthalic anhydride alkyd".

The high reactivity and symmetrical aromatic structure of PMA and PMDA qualify each for use either as a basic new polyester intermediate or as a modifying agent to produce unique properties in standard polymers.

Esters of PMA as Plasticisers. Several tetra-esters of PMA have been prepared and screened as plasticiser candidates. The tetra-butyl and tetra-2-ethylhexyl pyromellitates, for example, are compatible with both p.v.c. and p.v.c./p.v.a. copolymers. They are comparable in efficiency to DOP and considerably less volatile. In addition, mixed esters, such as dimethyl dibutyl and dimethyl diisooctyl pyromellitates, also are compatible with p.v.c. and appear, qualitatively, to be as efficient as DOP.

Radical Changes Planned in Management Education

Radical changes are to be made in the present schemes of management studies and commerce. Details announced on 28 March by Sir David Eccles, Minister of Education, show that there is to be a new diploma in management studies, an advisory council on management education, and two new national certificates in business studies.

In Parliament

Committee to Review Feedstuff Antibiotics

A JOINT Committee of the Agricultural Research Council and the Medical Research Council is shortly to review the whole problem of antibiotics in animal feeding-stuffs.

This was announced in the Lords last week by Earl Waldegrave, Parliamentary Secretary to the Ministry of Agriculture, who said that the sale or supply of compound feeding-stuffs and supplements containing antibiotics, other than on veterinary prescription, was confined by Statute to pig and poultry foods containing penicillin, aureomycin or oxytetracycline in certain prescribed and limited proportions. Under regulations based on advice from the A.R.C., in consultation with the M.R.C., the inclusion of those substances in manufactured feeding-stuffs was restricted to food for young pigs and poultry intended for early slaughter. Within the permitted categories of pigs and poultry the feeding of antibiotics, which might lead to improved rates of growth and better food conversion, was thought to be fairly widespread but he regretted that no precise information was available.

Regulations for Bulk Liquid Vehicles

Asked if he would make a statement in regard to the proposed regulations altering the maximum gross load from 24 to 28 tons for heavy duty bulk liquid vehicles, and if he was aware that the delay in coming to a conclusion was causing difficulties to manufacturers and operators, Mr. E. Marples, Transport Minister, said that while aware of these considerations, others, including safety considerations, had to be taken into account. He hoped, however, before long to reach a decision.

Import Duty Reduction?

It was stated in the House of Commons recently by the Parliamentary Secretary to the Board of Trade that import duty on mono-ammonium phosphate is at present being considered.

Symposium on Lower Olefins—I

Kellogg Speakers on Economics of Ethylene Production

ON the basis of its ready availability and price, light naphtha will continue to be a favoured feedstock for ethylene production in regions where natural gas is not available. This was stated by J. Chrones and J. L. James (Kellogg International Corporation) in their paper. 'Economics of ethylene production from light naphtha', read in Manchester during the Institute of Petroleum symposium on 'the industrial chemistry of the lower olefins on 24 March (see also C.A., 2 April, p. 566).

The authors, who presented much data on the costs of producing ethylene, including requirements facilities, catalysts and chemicals, said that the cost of the feed naphtha and the value credited for by-products were the biggest factors affecting the economics of ethylene manufacture from this feed. High severity operation, with recycle ethane pyrolysis to minimise feed consumption, was favoured under conditions of higher naphtha feed costs and relatively low by-product values. Conversely, lower severity operation with recycle ethane pyrolysis would be preferred when naphtha feed cost was low or by-product values high.

By-products Valuation

Valuation of by-products would vary from company to company depending on local conditions and particular requirements, but under present conditions the ethylene market was considerably greater than that for the other by-products as a source of valuable petrochemicals. Thus, based on present market potential, a high ratio of propylene to ethylene in pyrolysis could not be justified simply on the basis of its potential for polypropylene, because there was sufficient propylene by-product made with a high severity operation to more than satisfy even that expanding requirement.

For the present increasing ethylene market, producers should give careful consideration to installation of ethylene recovery capacity considerably larger than initial needs.

The by-products, produced to varying degrees, are propylene, butylenes, butadiene, higher molecular weight olefins, diolefins and aromatics. With the possible exception of butadiene, most of the by-products of naphtha pyrolysis were now produced well in excess of demand. This largely justified the use of lower, or gross by-product values, e.g., fuel, L.P.G., motor gasoline, etc., inasmuch as any upgrading or purification facilities must be justified on a basis of low 'raw material' values.

In general, therefore, the economics of ethylene production by naphtha pyrolysis were such that no allocation of manufacturing costs could be set against by-products, instead all manufacturing costs were assessed against the ethylene product. With the introduction of polypropylene and other end products in demand, by-product recovery from naphtha pyrolysis plants would assume increasing importance, with the value then assigned to these by-products proportionately affecting the production economics of ethylene. Ethylene, however, was likely to remain the principal 'building block' of the U.K. petrochemical industry.

The authors based their data on three types of unit (each being a plant designed to produce 100 million lb./year of polymerisation grade ethylene, 99.9% minimum purity). The units and the conditions which give rise to the differences in yield structure were:

Unit 1. By high severity naphtha pyrolysis with recycle of ethane product to pyrolysis. This approach emphasises minimum net feedstock consumption.

Unit 2. By medium severity naphtha pyrolysis with recycle of ethane product to pyrolysis. This gives an intermediate feed naphtha consumption.

Unit 3. By medium severity naphtha pyrolysis with *no* recycle of ethane. This results in higher feed naphtha consumption to maximinise by-product yield.

In addition, alternates 1a, 2a and 3a, were similar units but of double capacity, i.e. 200 million lb./year.

The high severity pyrolysis conditions differed from the medium severity in that higher temperatures, higher steam-to-naphtha ratios and shorter pyrolysis contact times were utilised.

Unit 1 had the lowest naphtha requirement and produced the least amount of by-products. Unit 3, required the maximum quantity of feed and produced the most by-products. Utility requirements were higher for Unit 3 than for Unit 1, the on-site process investments also increased slightly.

Valuation of by-products had a large effect on manufacturing cost and on the selling price. Over-valuation of certain products based on future potential might lead to an unrealistically low ethylene price. In each case it had been assumed that for the production of ethylene, a relatively low-risk commodity item, a minimum return on investment of 25% before taxes, was required. That corresponded to a cash flow of 22.8% at the indicated depreciation rate of 10%. Ethylene selling prices derived in this manner varied from 4.54d to 4.91d per lb. for the 100 million lb./year units and 3.75d to 4.08d for the double-capacity unit.

To illustrate the effect of plant size on the economics of ethylene production, the authors instanced a hypothetical producer requiring 100 million lb./year of ethylene during the first year's operation with a predicted annual increase in demand of 20 million lb./year up to 200 million lb./year. Three cases considered were:

Case A. Initial unit installed for 100 million lb./year, duplicate unit installed after five years.

Case B. Initial unit installed for 100 million lb./year, duplicate unit installed after three years.

Case C. Unit for 200 million lb./year installed immediately.

Units 1 and 1a gave the lowest manufacturing cost of ethylene. Table 2 summarises the pertinent economic data derived for the three cases. The six year average selling prices of ethylene for the

TABLE 2.—ECONOMICS OF ETHYLENE PLANT OPERATION

In this table initial demand of 100 million lb./yea increases annually by 20 million lb.

Time, Years	Production, M.lb./yr.	Manufacturing Cost d./lb.	Manufacturing Cost £M/yr.	Gross Profit £/yr.*
Case A.				
1	100	2.86	1,193	700
2	100	2.86	1,193	700
3	100	2.86	1,193	700
4	100	2.86	1,193	700
5	100	2.86	1,193	700
6	100	2.86	1,193	700
	100†	2.86	1,193	700
	700	2.86	8,351	4,900
Case B.				
1	100	2.86	1,193	700
2	100	2.86	1,193	700
3	100	2.86	1,193	700
4	100	2.86	1,193	700
	60†	4.01	1,001	700
5	100	2.86	1,193	700
	80†	3.29	1,097	700
6	100	2.86	1,193	700
	100†	2.86	1,193	700
	840	2.99	10,449	6,300
Case C.				
1	100	3.81	1,589	1,060
2	120	3.37	1,686	1,060
3	140	3.05	1,781	1,060
4	160	2.82	1,877	1,060
5	180	2.63	1,974	1,060
6	200	2.48	2,069	1,060
	900	2.93	10,976	6,360

* Both gross profit and selling price were required to give a return on investment of 25% before taxes. 6-year average selling price in d./lb. was Case A, 4.54; Case B, 4.79; Case C, 4.62.
† 2nd unit.

TABLE 1.—DERIVATION OF ETHYLENE SELLING PRICE

Basis:
- Fuel Value = £0.15 million B.t.u.
- Feed Value = £9.0/long ton
- P-P product value = £12.0/long ton
- B-B product value = £19.0/long ton (22% C_2H_4) £24.0/long ton (24% C_2H_4)
- Pyrolysis gasoline value = £10.0/long ton (90 RON) £14.0/long ton (100 RON)

Unit	1	2	3	1a	2a	3a
	100 million lb./yr.			200 million lb./yr.		
Manufacturing cost d./lb.	2.86	3.05	3.11	2.48	2.66	2.72
Gross profit required for 25% return before taxes, d./lb.	1.68	1.77	1.80	1.27	1.34	1.36
Selling price for 25% return before taxes, d./lb.	4.54	4.82	4.91	3.75	4.00	4.08

various cases are: 4.54d/lb. for the conservative Case A approach; 4.79d/lb. for the intermediate Case B, and 4.62d/lb. for the single large unit, Case C. It was evident that a single large unit was highly attractive in comparison with two half-sized units. With the larger unit the producer was also able to satisfy consumer needs even if they expanded faster than predicted. From the sixth year onwards, at full capacity conditions, the larger unit had a selling price advantage of 0.79d/lb. over the smaller units.

The position might be even better than that, since the ethylene unit as a whole might be constructed with the recovery section designed for the maximum expected production rate, but with the pyrolysis section, comprising pyrolysis furnaces, quench exchangers, etc., installed for only the immediate plant demand. Extra pyrolysis furnaces could readily be added as and when needed up to the full capacity of the recovery section. For the larger ethylene plants, similar arrangements for the reduced capacity might be made with the process gas and/or refrigeration compressors.

D.C.L. Speaker on Acrolein Route to Acrylonitrile

ACROLEIN, if it could be produced cheaply enough, would be a most useful intermediate, particularly for the production of glycerol and acrylonitrile, stated Mr. A. F. Millidge (Distillers Company Ltd.) at the Institute of Petroleum symposium held in Manchester on 24 March. His paper was entitled 'Industrial chemicals based on ethylene and propylene'.

Processes for the oxidation of propylene to acrolein involve the gas phase reaction of propylene with air or oxygen over special catalysts.

Catalyst systems were curpous oxide (Shell) and copper oxide plus selenium (Distillers). Mr. Millidge said it was believed that acrolein was already produced in the U.S. using the Shell catalyst, but it was not clear on what scale. The use of selenium, although leading to a very selective oxidation, had the obvious disadvantage that a selenium recovery system had to be incorporated.

Standard Oil (Ohio) had recently introduced a new catalyst system, bismuth phosphomolybdate, which was claimed to give very good yields and conversions to acrolein. For example, at 430°C and a contact time of 3 sec., using bismuth phosphomolybdate supported on silica, a yield of 70% at a conversion of about 45% was said to have been obtained.

The best operation was reportedly carried out in a fluidised bed. Heat removal could be a serious problem and required the use of either quite narrow tubes (with a fixed bed system) or of a fluidised bed. Recovery of acrolein from the somewhat dilute gas streams from these processes could be carried out by scrubbing with water, followed by distillation.

Conversion of acrolein to acrylonitrile by reaction with ammonia and oxygen (the ammoxidation process referred to in C.A., 9 April, p. 601) operated in the vapour phase over a variety of metal catalysts could give high yields of acrylonitrile.

Given cheap acrolein such a process would represent a commercially feasible and economically attractive method for the production of acrylonitrile.

Conversion of acrolein to glycerol could be carried out by two routes, according to Shell publications. These are shown below.

The former route, it had been reported, was to be commercialised in the U.S., using hydrogen peroxide produced by the oxidation of isopropanol. No further details had been published.

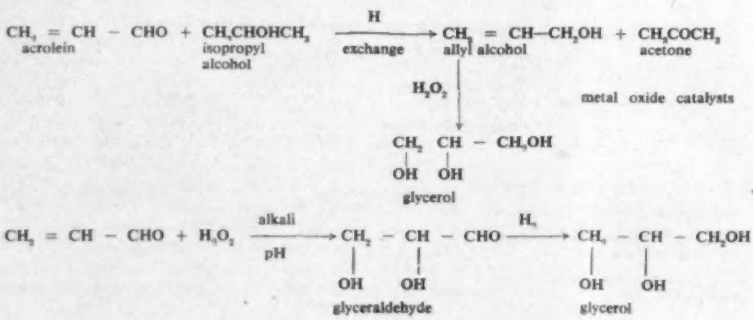
A process for the conversion of propylene to acrylonitrile, giving good yields and conversions, was announced by Sohio early last year. It appeared that their catalyst was supported bismuth phosphomolybdate. In effect that was the same catalyst as used for the oxidation of propylene to acrolein and it seemed likely that acrolein was an intermediate in the acrylonitrile process.

A large commercial plant was under construction in the U.S. to use the process and it seemed probable that the reaction stage would be operated in a fluidised bed system, at a reaction temperature of 400-500°C and a pressure of below 3 atm., in the presence of steam as diluent.

Propane was said to be inert under the reaction conditions and a refinery stream of propylene and propane could therefore be used as feedstock. Butenes and some higher hydrocarbons would react and must be removed from the feed material. The reaction product contained, besides acrylonitrile, some acetonitrile, hydrogen cyanide and oxides of carbon. Recovery and purification of the acrylonitrile were stated to be comparatively simple, but no details had been given.

This process, based on cheap raw materials and requiring only one reaction stage, would appear to have definite economic advantages over the established routes to acrylonitrile from hydrogen cyanide and acetylene or ethylene oxide.

Among the many other chemicals referred to by Mr. Millidge in his paper were propylene oxide and glycol. He said that as yet there was no industrial process for the direct oxidation of propylene to the oxide, although the gas phase oxidation over a silver catalyst had been claimed in patents, and the liquid phase oxidation to give oxide and glycol had been similarly described.



Monsanto Acquire Foam Firm and Plant Unit for Expandable Polystyrene

MONSANTO Chemicals Ltd. are to purchase Flamingo Foam Ltd., 34 Victoria Street, London S.W.1, the British subsidiary of A/S Flamingo Foam, of Copenhagen. The Danish company manufactures polystyrene board which has been marketed in this country by Flamingo Foam Ltd. Under the terms of the agreement the British company will now manufacture and market its own insulating board.

Management of the operation will be undertaken by Mr. Gilbert Dodd, in addition to his activities with Monsanto and R. H. Cole and Co. Ltd. The first factory will be in the London area and to meet the increased need for raw material—expandable polystyrene beads—Monsanto will build a new manufacturing plant at Newport.

Ilford to Introduce New Photographic Solution

A new combined developer-fixer, Monophen, shortly to be introduced by Ilford Ltd., is claimed to make incorrect development impossible, due to the wide range of temperatures (65 to 80°F) and time latitude permissible.

Monophen will be sold in containers of 500 c.c., costing 8s 9d, and supplies are expected to be in the shops after Easter.

Which Govt. Department?

A new alphabetical 'Index of industries and products with the Government Departments principally concerned,' is obtainable on request from the Librarian, Board of Trade Library, Horse Guards Avenue, London S.W.1, and the price is 2s, including postage. A great many chemicals are mentioned individually in the index.

Safety in the Chemical Industry

PLANT DESIGN IN RELATION TO PROCESS HAZARDS

CHEMICAL process hazards, with special reference to plant design, were discussed in 12 papers at a recent symposium organised by the North-Western branch of the Institution of Chemical Engineers at the Manchester College of Science and Technology. Impressions of the papers and the discussions which followed are given by a special correspondent who writes:

The programme covered a wide range of papers dealing with what may be regarded as the classical chemical hazards, i.e., gassing, dermatitis and injuries caused by fire or explosion. It was very well balanced and, not only had the authors and subjects been well chosen, but the layout of the meeting was good.

So far as I know, there has never been a similar conference on these lines. It has for a long time been a basic axiom that organised safety should commence with the drawing board, whatever the process, but it has been left to our own industry's professional body to set the ball rolling.

The papers, with the relevant discussions, are to be published as part of the *Transactions* of the Institution in due course, but one wonders whether it might not be more suitable to issue them as a book. It was clear that in some cases the results presented were really the beginnings of much bigger things and the papers formed a warning of hazards and suggestions of the way to assess them.

Keeping Up-to-Date

If the information given during the meetings were issued as a book, there could be further editions as more details became available. Such a work might well take its place alongside "Perry" and other similar publications.

The conference kept its feet firmly on the ground. There were a number of references to the fact that safety costs money. As far as safety meetings are concerned, this is rarely mentioned. It is a subject which everybody understands but never talks about. Speakers said that to do the obvious would be so expensive as to make the process uneconomic. This remark occurred several times.

The papers, all of which were good, could be broadly divided into two classes, those in which the results of researches on safety were presented and those which were examples of what had been done to make a process less hazardous. The series was effectively introduced by Dr. D. M. Matheson of the Chemical Branch, Factory Inspectorate, who discussed the whole problem in general terms and formulated the principles on which the work of the Inspectorate was based.

Papers presented at the symposium were:

'Some significant chemical accidents', Dr. D. Matheson (H.M. Factory Inspectorate, Chemical Branch); 'An approach to the problem of process hazards in plant design', A. D. Thackara, R. B. T. Hall-Craggs and R. M. Robb (Thomas Hedley and Co.); 'Automatic control and instrumentation for hazardous processes', B. W. Balls and A. H. Isaac (Foxboro-Yoxall Ltd.). 'The relief of pentane vapour—air explosions in vessels', J. H. Burgoyne and K. E. Bett (Imperial College) and R. Muir (Lankro Chemicals); 'Explosion hazards in the manufacture of terephthalic acid', Dr. D. H. Derbyshire (I.C.I. Fibres Division).

'The quenching of flame by perforated sheeting and block flame arresters', K. N. Palmer (Joint Fire Research Organisation). 'Explosion reliefs for duct systems', Dr. D. J. Rasbash and Z. W. Rogowski (J.F.R.O.); 'The design of explosion reliefs for industrial drying ovens', W. A. Simonds and P. A. Cubbage (Gas Council, Midlands Research Station); 'Hazards in handling acetylene in chemical processes, particularly under pressure', S. A. Miller and E. Penny (British Oxygen Research and Development Ltd.); 'The design of plant handling hydrofluoric acid', K. M. Hill and H. Knott (Atomic Energy Authority); 'Storage, pumping and piping of hazardous liquids', S. F. Grover and B. G. Wilson (Associated Ethyl Co.).

During the discussion, one speaker asked if it were possible for the vast store of experience in the files of the Inspectorate to be made more readily available. There are numerous publications of the Factories Department on various subjects but it is doubtful whether a really satisfactory method of covering the questioner's wishes could be found, unless the department prepared a safety manual. When all is said and done, any person into whose premises the Factory Inspector has the right of entry has the equal right to expect that, so long as his actions do not bring him within the scope of the Courts, matters which he believes to be his own trade secrets will not be made available to his competitors.

It was noticed that when toxic limits were quoted, the authorities were usually American. Are there no 'Official' figures for these limits? It is known that I.C.I. determine their own and from time to time allow some of these to be published in the A.B.C.M. Quarterly Safety Summary. It would be of great value to our industry if an indication could be given that these figures would be 'officially' accepted.

The whole of Wednesday's two sessions was taken up with consideration of fire and explosion, there being eight papers. Fire and explosion are far more spectacular and much less subtle than poisoning, and the remedies are, at first glance, obvious. When one gets down to facts, however, they often seem less so. The question of using an inert diluent seems to be one of economics. In the oxidation of *p*-xylene, it proved less costly to operate the actual oxidation stage so that the partial pressure of the steam was sufficient to inhibit any tendency to combustion. In the same process, the condensing stage had an explosion hazard which was accepted and that stage was protected so that if an explosion did occur, the damage would be restricted to the minimum. This would appear both correct and logical.

On the other hand, it was shown that explosions of ethylene oxide could be prevented by the use of inert diluents. In this connection, the point was made that it is equally important to take note of any changes which may take place during storage, e.g. polymerisation. Reactions such as this may be the cause of 'unexplained' incidents.

Explosion reliefs in one form or another were mentioned in four of the papers, and there seems no doubt that although a large amount of information has already been obtained, much more remains to be done. One came away with

Deep in discussion are, left to right, Dr. J. H. Burgoyne and Mr. K. E. Bett (Imperial College), Dr. S. A. Miller and Mr. E. Penny (British Oxygen Research and Development Ltd.), and Mr. A. H. Isaac (Foxboro-Yoxall Ltd.)

Safety in the Chemical Industry

the feeling that the certain relief of an explosion in any system was as much an art as a science.

There was, however, not complete unanimity on the value of explosion reliefs. S. A. Miller and E. Penny considered that in the case of acetylene explosion in ducts, no form of explosion relief would open in a sufficiently short time to relieve the explosion pressure before it passed the opening. They had found that the explosion could be quenched by a tower filled with small Raschig rings. There would remain some pressure due to the expansion of the gas, and so the tower would have to be of robust construction.

J. H. Burgoyne and M. J. G. Wilson suggested that in the case of pentane-air explosion a smoothly opening plate-valve was to be preferred to a diaphragm.

The design papers on this subject covered the relief of explosions in ducts and in drying ovens respectively. The Fire Research Station has been examining this subject in detail in view of its importance to those concerned with the reduction of damage by fire. Dr. D. J. Rasbash and Z. W. Rogowski, Joint Fire Research Organisation, described work they had done on this subject and enunciated the principles on which they believed satisfactory relief could be obtained.

Seen here at the symposium dinner are Mr. B. G. Wilson (The Associated Ethyl Co. Ltd.) and Mr. H. Knott (U.K. Atomic Energy Authority)

Explosion reliefs in ovens were discussed by W. A. Simmonds and P. A. Cubbage. Ovens of one sort and another are in very wide use and are a constant source of danger, whether it be from the vapours being removed or from inflammable mixtures of fuel vapour. The authors described the work they had done in this field. Although primarily concerned with the use of town gas, the results shown will be of very great value to users of other fuels.

Acetylene is accepted as a hazardous substance, but if that fact is accepted and understood, it can be safely used. Every conceivable source of ignition must be removed and only suitable materials of construction used. Plant must be designed to avoid any chance of a deflagration proceeding to detonation. Flash arrestors are necessary to protect items of plant.

Corrosion hazards, and toxic hazards were considered, the example being hydrofluoric acid. In this paper, the question of weld examination and quality was considered and discussed in some detail. The adaptation of a particular plant to another purpose involving the making of a phosphorus insecticide was described. This paper showed what could be done without much expenditure of money, to make a plant safe in a very short time.

Instrumentation was not omitted, and the paper by A. H. Isaac covered this field. The author was at great pains to indicate what could and could not be achieved by adequate instrumentation and pointed out a number of pitfalls, e.g. time lag and temperature lag. He also pointed out that elaborate instrumentation could not compensate for inadequate supervision.

Grouped together, left to right, are Dr. W. Norman, Mr. A. V. Bailey and Mr. R. J. Kingsley (committee member, hon. secretary and treasurer, North-west Branch), Dr. J. B. Brennan (general secretary), Dr. W. A. Simonds (Gas Council, Midlands Research Station), Dr. J. S. Hunter (vice-chairman), Mr. P. A. Cubbage (Gas Council, Midlands Research Station), Prof. M. E. J. Cathala (vice-president of the Institution)

'Chemical Age' Survey of New Safety Equipment and Apparatus

SERVO-OPERATED RECORDER

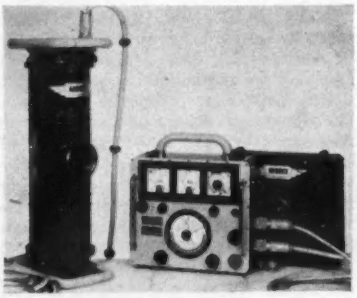
THE Capacipoise Servograph, by **Fielden Electrics Ltd.**, Wythenshawe, Manchester, is a highly compact transistorised recorder, servo-operated and available in a.c. or d.c. ranges. Two electrical contacts may be fitted in the instrument for alarm or control purposes. The operating position of either of the two pointers can be altered at will by a single control inside the front cover of the instrument.

Standard relays can be supplied having a coil resistance of approximately 250-300Ω and are arranged to energise at not more than 8.5 volts.

PORTABLE X-RAY UNIT

A NEW 200 kV portable X-ray unit, weighing only 100 lb., has recently become available. This unit, the Andrex 200, is manufactured by Holger Andreasen of Copenhagen, and is freely available in this country through the sole distributors, **Watson and Sons (Electro-Medical) Ltd.**, East Lane, North Wembley, Middlesex. It provides a tube current of 5 mA, and has provision for water cooling, giving a 100% duty cycle. It is suitable for 1½ in. steel, to Class 1 standards, or 2½ in. steel using fast calcium tungstate intensifying screens.

Distribution in the U.K. of the units has recently been taken over by the Industrial Division of Watson and Sons. They were previously distributed by B.I.X. Ltd., 73 High Holborn, London W.C.2, who will continue to provide a full radiographic inspection service.



Portable X-ray unit

Units are available of 130 kV (automatic), 140 kV, 160 kV, 160 kV—360°, 200 kV and 260 kV, giving a range of penetration from thin aluminium to over

3 in. of steel. All are of the robust, lightweight tank variety, with the transformers in the X-ray head and with no high tension cables.

BATTERY PORTABLE AIR-SAMPLER A PORTABLE battery-operated air sampler has been newly developed by the **Gelman Instrument Co.**, 106N, Main Street, Chelsea, Michigan, U.S. The new sampler frees the user from power lines and line cord. Air pump, batteries, flowmeter, filter-holder and battery charger are all contained in a durable shoulder bag. The complete unit weighs only 14 lb.

The sampler allows engineers to take

Air sampler by Gelman

dust or gas samples in the field where no power lines are available. Operation is simple and economical, and many months of constant usage is normal without replacing the battery. Atomic inspectors and industrial hygienists may appreciate being able to take the sampler with their luggage on emergency inspection tours. For breathing zone measurements the sampler can be worn by a workman with the filter holder or impinger pinned to his work clothes. It is available with a choice of batteries.

SQUIRREL-CAGE MOTORS BY G.E.C. A NEW range of totally enclosed, fan-cooled, squirrel-cage motors with Class E insulation and complying with Draft B.S. A(ELE) 1629 has been introduced by the **General Electric Co. Ltd.** Motors of up to 7½ h.p. at 1,500 r.p.m., and 5 h.p. at 1,000 r.p.m., are immediately available from stock. Sizes up to 40 h.p. will be available shortly.

These 'D' frame machines have a continuous maximum rating in accordance with B.S.2613 for a temperature rise of 65°C in ambient temperatures up to 40°C. They are interchangeable with ventilated machines ('C' frames) of the same rating complying with B.S.2960.

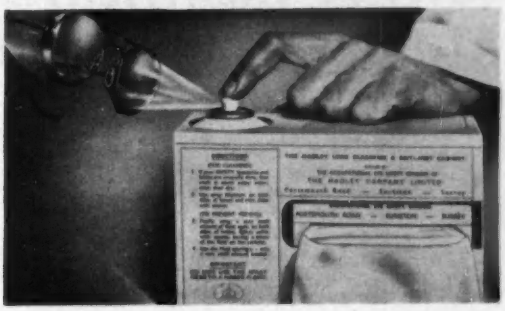
Further details can be obtained from the company's Rotating Plant Division, Witton, Birmingham 6.

ANTI-MIST AND CLEANING UNITS MANY eye accidents are caused through the reluctance of workers to wear the protective equipment provided by their companies.

One of the real objections to wearing such equipment is that the lenses mist up, and in many factories conditions exist

Safety in the Chemical Industry

The Hadley lens cleaning and anti-mist cabinet

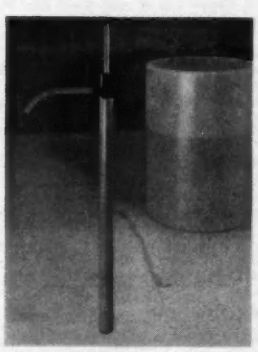


which unavoidably cause the fogging of lenses. Or the act of going from a cold into a warmer atmosphere causes a mist up of lenses which can be dangerous.

The problem has been thoroughly examined by the **Hadley Co. Ltd.**, Portsmouth Road, Surbiton, Surrey, and they believe they have found a satisfactory solution.

The lens cleaning and anti-misting unit is housed in a cabinet robustly constructed in strong sheet metal overprinted with instructions for use. Full details are obtainable from the address above.

SAFETY HAND PUMP FROM NALGE CO., U.S. A COMPLETELY new hand pump fabricated entirely from Nalgene, type H (linear, low pressure, high density) polythene for chemical resistance and rigidity, is being



Nalge safety hand pump

manufactured by the **Nalge Co. Inc.**, P.O. Box 365, Rochester 2, N.Y., New York, U.S. The pump is said to be efficient, practical and economical, providing a safe, easy method of pumping virtually any liquid from carboys, drums and tanks.

A small drip well at the top of the pump barrel prevents liquid adhering to the shaft from running down the side and coming in contact with the operator's hands. The spout is fixed into the pump with friction-fit for a two-fold purpose. It can be turned up after dispensing, to eliminate the hazard of dripping, and the spout can be removed for shipping or storage.

The straight line design and self-cleaning ball valve arrangement "assure smooth unimpeded flow, hydraulic efficiency and long life". The pump will handle slurrys as well as clear liquids. There is nothing to take apart or oil, no screen to clean, and no leathers to dry out. Small lugs on the bottom prevent the pump from resting on the floor of the container and permit complete emptying of the drum. Attractively designed in red and black, the pump has good 'visibility' and is easily seen when needed.

The pump is light in weight, easy to handle and low in cost. It can be inserted 34 in. into the container. Capacity is approximately six strokes per gal. (20 oz.) and O.D. is 1 13/16 in. Price is $15.00.

BAKELITE NON-SKID FLOORING STATISTICS have shown that in Britain some 35% of the fatal accidents in industry are caused by falls, and no less than 26,717 people were injured in 1958 for the same reason. Although it is not revealed how many of these accidents resulted from slippery floor surfaces, it is believed that a substantial portion were either partially or wholly due to this factor, and it is with this in mind that **Bakelite Ltd.**, 12-18 Grosvenor Gardens, London S.W.1, have developed a new type of non-skid flooring composition based on the company's epoxide resins. The material is suitable for use in locations such as stairs, steps, ramps, loading bays and even on road surfaces.

Epoxide resins, when cured, have good chemical resistance, are resistant to abrasion (particularly when used with appropriate fillers) and have good adhesion to many types of surface. Two methods of making non-skid flooring have been developed—the first utilising a heavily filled resin/hardener mix and the other entailing application of a resin/hardener mix, followed by an aggregate filler. Further particulars may be obtained from the company.

Teachers Visit Pfizer Ltd.

Pfizer Ltd. held a weekend meeting for senior science teachers at their Sandwich plant from 1 to 3 April. It was part of Pfizer's programme to forge closer links with the teaching profession.

SUGAR-BASED DETERGENTS AND SEWAGE TREATMENT STUDIES AT DURHAM UNIVERSITY

RESEARCH into the biological stabilisation of sugar-based detergents has continued at the Department of Civil Engineering, King's College, University of Durham, by Mr. D. Jenkins. This work was supported by the Sugar Research Foundation Inc. of New York until 30 June 1959, but is now being supported by the college. A new straight-chain alkyl-benzene-sulphonate is under investigation and a large-volume monometric method has been developed by Mr. Jenkins.

Majority of the experiments performed so far, have been designed to study the effect of various detergents on the uptake of dissolved oxygen by sewage micro organisms under the conditions of the B.O.D. test. Sugar-based detergents investigated by this means for their susceptibility to biological oxidation were Sucrodet D-600, Sequol-260, SE-957, SME-80 and sucrose stearate developed by Howards of Ilford.

B.O.D. Studies.—Rates of oxidation of the above mentioned detergents varied greatly, it is reported. In general the agents which formed more stable and fine aqueous dispersions caused a more rapid oxygen uptake, and were oxidised to a greater extent. Sucrodet D-600, a sucrose dipalmitate, proved difficult to disperse in an aqueous medium and impossible to keep in suspension, while SE-957 formed a fairly good and stable emulsion with water.

Sodium Dobane JN

Sodium Dobane JN sulphonate is produced by sulphonation of the alkyl-benzene Dobane JN which is a mixture of substances containing a high proportion of molecules with unbranched alkyl chains. Wetting, detersive and foaming properties of sodium Dobane JN sulphonate are reported to be similar to those of the branched-chain tetrapropylene-benzene-sulphonate. With regard to the breakdown of sodium Dobane JN sulphonate under BOD conditions, it was noted that after a lag period varying from 70 to 90 hours, a rapid decrease in concentration of alkyl-benzene-sulphonate took place in all but one of the experiments. The period of active degradation of the alkyl-benzene-sulphonate corresponded with a period of brisk dissolved-oxygen consumption. The concentration of the sulphonate reached a stable minimum value of about 1 p.p.m. Rapidity of degradation appears to increase with increasing concentration of active agent and the rate of biological breakdown has been found to increase up to concentrations of 18 p.p.m. of alkyl benzene-sulphonate.

Manometric Studies.—Work is now in progress using a manometric apparatus constructed in the department. Similar to that described by Snaddon and Harkness (*Wat. Wast. Treat. J.*, 1959, **7**, 250) the apparatus is a constant pressure system. Changes in pressure resulting from oxygen uptake by the 'respiring' sample are shown by manometer. Carbon dioxide produced is absorbed by KOH contained in a bowl suspended in the respiration flask. The tap system makes it possible to flush out the apparatus with oxygen; introduce oxygen from a cylinder into a low-pressure oxygen reservoir in the constant-temperature water-bath; fill a graduate pipette with oxygen from the oxygen reservoir; distribute oxygen, in measured amounts, from the pipette to any of the respiration flasks; isolate the respiration flasks from the manometers so that either oxygen may be added in excess or the sample may be left for long periods without any regular additions of oxygen, i.e. overnight.

All glass lines are 2 mm. bore capillary, and all taps are capillary stopcocks. All inter-glass connections are made with fine bore polyvinyl tubing (Portland Plastics Ltd.), using sawn-off hypodermic needles as glass-to-tubing reducing nipples. The respiration flask has been constructed by Quickfit and Quartz Ltd. and consists of a flat-bottomed 1-l. flask with a central B24 neck holding a B24 stopper to which a CO_2-absorption boat is fixed. The flask also has four B14 side-necks, two of which carry B14 cones attached to capillary stopcocks connecting the flask with the manometer and oxygen-supply system respectively. The other two side-necks fitted with rubber self-sealing vial caps allow addition or withdrawal of samples of either gas or liquid.

This apparatus is being used for a detailed investigation of the breakdown of detergents and of the effect which synthetic detergents in high concentrations have on the respiration of settled sewage

Memorial Service to Mr. Victor Blagden

A MEMORIAL service for Mr. Victor Blagden was held on Monday at St. Peter's, Vere Street, London W. The Rev. J. R. W. Stott officiated and gave an address. Those present included:—

Mr. and Mrs. Cecil Blagden (son and daughter-in-law), Mrs. G. Lush (daughter), Mr. James Lush (son-in-law, chairman, Victor Blagden and Co.). Gwendolen Lady Benn, Mr. R. Sparrow and Mr. A. E. Sheterline (directors, Victor Blagden and Co.), and Mrs. Sheterline, with members of the staff; Mr. William E. Brandt (director, William Brandt's Sons and Co.), Mr. Henry A. Brandt (chairman, William Brandt's (Timber) Ltd.), Brigadier H. C. J. Yeo (representing Burt, Boulton and Haywood Ltd.), Dr. R. Lessing (representing the Hydronyl Syndicate), Mr. J. E. Holden (representing the director of Hardman and Holden Ltd.), Mr. W. E. Cartwright (representing the chairman, Benzole Producers Ltd., and William Butler and Co. (Bristol) Ltd.), Mr. F. G. W. Paige (director and secretary, British Chemical and Dyestuffs Traders' Association), Mr. C. J. Johnson (sales manager, chemical products), North Thames Gas Board), Mr. N. Chatters and Mr. J. M. Tyson (Pitch Marketing Co.), Mr. Mackintosh Williams (president, Tar Residuals Ltd.), with Mr. W. P. Waugh, Mr. F. Skelton (CHEMICAL AGE).

Joint Symposium on Determination of Gases in Metals

A symposium on the determination of gases in metals, organised by the Society for Analytical Chemistry in conjunction with the Iron and Steel Institute and the Institute of Metals, will review the present position, and will survey the latest techniques available. In addition to review papers covering oxygen, hydrogen and nitrogen, there will be papers on vacuum-fusion, carrier-gas, activation analysis, emission spectrometric, and internal friction methods of determination.

The symposium will be held at Church House, Great Smith Street, London S.W.1, on 3 and 4 May. Details and registration forms may be obtained from the Iron and Steel Institute, 4 Grosvenor Gardens, London S.W.1.

New Bulletin on TBE for Mineral Processes

FIRST issue of 'The TBE Bulletin' produced by Baker Perkins Ltd., Blackhorse Road, Letchworth, Herts, in association with Israel Mining Industries, has just been published. Designed to give information on the use of tetrabromoethane in the processing of ores and the separation of solids, the bulletin will be published at regular intervals.

The introductory article in the first number outlines the general properties of TBE, its uses in mineral processing and the advantages of heavy liquids over dense media. It is written by Mr. S. W. F. Patching of Baker and Perkin's Mineral Processing Division.

A joint article, 'TBE-cyclone concentration of tungsten ore pilot plant tests', is contributed by A. Mitzmager and J. Mizrahi, Israel Mining Industries, Haifa.

First Experiment Series Completed at Dounreay

The first series of experiments with the fast-breeder reactor at Dounreay (Caithness) were recently completed and the reactor has been shut down for about three months while changes are made in the core so that a wider variety of types of fuel can be tested. As an experimental tool, the Dounreay reactor has been designed so that minor and major components may be easily replaced when different designs have to be tested. Operations at low power started in November 1959.

S.I. Polarographs for Mainland China

During the year ended 31 March 1960, Southern Instruments Ltd., Camberley, Surrey, have supplied 10 of their K1000 cathode ray polarographs to a value of £8,000 to the People's Republic of China. Thirteen of these instruments are now in use in China.

Overseas News

SHRINKABLE POLYTHENE SUCCESS CLAIMED FOR GRACE'S CRYOVAC

FIRST successful shrinkable polythene is claimed by W. R. Grace's Cryovac division. Known as Cryovac Type L, it is a new low density high pressure polythene with a 'built-in' two-way stretch. At 180°F or over, the film starts to shrink equally in all directions back to its original size. This effect has been accomplished by cross linking.

According to Grace either L.P. or H.P. polythene, polypropylene or various copolymers can be used. The film is passed under a General Electric electron beam generator which bombards it with up to two million electron volts and so sets hydrogen atoms free. Monatomic hydrogen atoms continue to go off as gas. Active sites remaining on carbon atoms then couple together forming cross-links with adjacent chains. This cross linking increases the film's tensile strength by more than 500%, it is claimed. With the added strength, this film can be stretched more than 200% biaxially. Subsequent heating causes the film to revert to its pre-stretched size.

Cryovac L, is described as a strong, transparent 'breathing-type' film with excellent printing qualities and a high gloss and clarity. Tensile strength ranges between 8,000 and 16,000 p.s.i. according to thickness, compared with 1,350 to 2,500 p.s.i. for film before irradiation. The film tears easily, however, once a tear is started. (10 to 15 gm./ml. on the Elmendorf tear tester against 150 to 300 gm./ml. range for other polythene films.)

The new film is priced at $0.03 per 1,000 sq. in. at 1 ml. thickness—about the same price bracket as Cellophane and only a little more expensive than standard polythene films. The irradiated film is now in commercial production. Main market for the film will be form-fitting wrappings for foods.

Plastics Division Formed by Union Carbide Australia

A Plastics Division has been formed by Union Carbide Australia Ltd., and the two other operating companies have been renamed in order to describe more accurately their current and future activities. The Eveready Co. becomes the Consumer Products Division, and Timbrol Co. will be known as the Chemicals Division.

The Plastics Division has been formed to construct and operate a polythene plant at Altona, Victoria, and to organise marketing of the products. Contract for the plant has already been placed, and completion is due by mid-1961.

In addition to Eveready products, the Consumer Products Division will in future market other Union Carbide Corporation consumer goods which may be introduced to the Australian market. The Chemicals Division will manufacture and market all Timbrol products, in addition to other chemical products from Union Carbide plants in the U.S.

By mutual agreement between Union Carbide Australia Ltd. and Robert Bryce and Co. Ltd., the latter-named will relinquish their distribution of the plastics and chemicals manufactured by U.C., and this will be taken over by the Australian affiliate of the U.C. Corporation. The new arrangements take effect next 30 June.

High Trans-Polybutadiene from Phillips Chemical

High *trans*-polybutadiene, to be known as Trans-4 rubber, is now being produced on a pilot plant scale by Phillips Chemical. Made with an undisclosed solution process that gives a product with about 90% *trans* content, the material is said to resemble balata and gutta-percha in many of its properties. Outlets are seen as being in golf ball covers, cable covering, shoe soles and floor covering.

Phillips Chemical are already producing *cis*-polybutadiene at the rate of 100 tons a month and are expanding their Borger, Texas, plant to a 20,000 tons/year capacity.

Japanese Plan New Ethylene Plant

An ethylene plant is to be built at Yokkaichi, Japan, by Mitsubishi Petrochemical to supply additional monomer for the firm's polythene unit which has an estimated capacity of 30 million lb. per year.

International Petroleum's Columbian Development

Construction is expected to start in about a year on a $13 million ammonia and nitric acid plant in Columbia for International Petroleum Co. Ltd. It will be at Cartagena where the Canadian firm has a 25,000 barrel-per-day refinery. Output of the new plant is put at 300 tons of ammonia and 150 tons of nitric acid a day. An ammonium nitrate plant, under joint ownership, will be built at the same time and both will be on production in 1962.

30 Nations to be Represented at Berlin Rubber Conference

Synthetic rubber and synthetic fibre for the rubber industry will be in the foreground of the traditional International Rubber Conference to be held this year from 4 to 7 October at the Berlin Congress Hall. 30 nations will delegate outstanding rubber and synthetic fibre experts to the conference, for a worldwide exchange of experiences covering recent scientific developments.

Subjects on the agenda include problems of topical interest covering the chemical, physical and technological aspects of synthetic rubber and synthetic fibre developments for application in the rubber article industry, as well as testing methods. Organisation of the conference is being handled by Deutsche Kautschuk-Gesellschaft, a scientific association of chemists, physicists and engineers concerned mainly with the promotion of rubber research, and will be coupled with an exhibition of rubber processing and testing machines.

British Competition Hits U.S. Trichloroethylene Producers

Trichloroethylene imported into the U.S. last year is said to have been priced lower than the home produced vapour degreasing solvent, in spite of duty, shipping and insurance costs. The difference is reported from half a cent upwards. Imports during the year were 52 million lb.—12% of the country's total supply of 415 million lb.

Most of the trichloroethylene arriving in the U.S. comes either from Italy (35% last year) or the U.K. (33%). About 16% of total shipments were from West Germany and France. Import totals are expected to be higher again this year.

Surplus chlorine has led to the emergence of Italy as a large producer while one U.S. producer reports loss of some big customers because of British competition.

Gibberellic Acid to Improve Malting

Stated to be the first industrial use of gibberellic acid to be sanctioned by the U.S. Food and Drug Administration, the addition of one or two p.p.m. to barley is claimed by Elanco Products to improve malting. The resultant malt has "improved enzymatic characteristics."

Portugal Starts Synthetic Resins Production

A Portuguese concern, Soc. Nacional de Saboes, has recently inaugurated a synthetic resin plant, equipped with German-made machinery, located at Marvila, Lisbon. The new plant cost some 17 m. escudos and will use largely local raw materials, excepting a few chemicals which are not at present made in Portugal.

Texas Gulf Sulphur Cuts Handling Costs

Designed to cut handling and shipping expenses by 35 to 40%, a $3 million marine terminal at Beaumont, Texas, is now handling both molten and bulk sulphur for Texas Gulf Sulphur. The company has an ocean-going vessel to carry both molten and bulk sulphur from Beaumont to Tampa, Florida, where there is another molten storage terminal. The vessel can carry up to 7,500 tons of molten sulphur or 8,000 tons of dry cargo.

The Tampa storage will handle one ship load molten and 50,000 tons of bulk

material. Bulk sulphur will be moved to other ports by a 5,000-ton deep sea barge. By the middle of this year the company expects 20% of all shipments to be molten.

Benzole Refining in Mexico

Altos Hornos de México S.A., of Monclova in the north Mexican State of Coahuila, have placed an order with the Heinrich Koppers GmbH concern, of Essen, for the erection of their site of a plant for the catalytic refining of crude benzole. Working to the German BASF-Scholven process, the plant will have a monthly capacity of some 800 tonnes.

Styropor Production In France

Société Dispersion Plastique, Franco-German subsidiary of the Kuhlmann chemical concern of Paris and the Badische Anilin- und Soda-Fabrik AG of Ludwigshafen-on-Rhine, have begun production of the B.A.S.F. plastics Styropor. It will be produced at the Dispersion Plastique plant at Villers-St. Paul in large enough quantities to cover total French home demand.

New Solder Invented in South Africa

A piece of ordinary sheet aluminium which had been tested for ultimate stress by the South African Industrial Research Laboratories, and then welded by a new process, remained intact at the joint after further similar tests.

This is stated by Mr. G. P. Strike, the inventor of a soldering process for which world patents rights have been sought. It is claimed that the solder will join any metal, with the exception of black or cast iron. The process enables magnesium castings and "all its alloys, including the duralumin range, to be successfully welded". A copy of a report on the process is available from the South African Bureau of Standards.

U.S. Borax Prepare for Increased Demand

The U.S. Borax and Chemical Corporation, American operating company of Borax (Holdings) Ltd., are to install a 1,300-ft. mechanised conveyor system at the open pit borate mine at Boron, California. Work on the project is due to start in May and will be completed in the autumn.

The borate deposits at Boron are said to be the largest and richest in the world, and at present the open pit measures 2,000 ft. long 1,700 ft. wide and 275 ft. deep.

Natural Gas in Austria

Professor Hohn, director of Stickstoffwerke AG, stated in Vienna recently that the role of natural gas and mineral oil and their synthetic products would have to be treated more seriously than formerly as the stress-point in the development of the Austrian chemical industry. Natural gas in particular opened great opportunities to the industry, for the production among other items of high-quality synthetic fibres and the polypropylene which was to be produced in a new installation at Schwechat of Danubia-Petrochemie AG.

Yugoslav Chemical Exhibition will Provide Plant Business

Third exhibition of the Yugoslav chemical industry to be held in Belgrade from 21 to 30 June 1960 will make possible business contacts that will contribute towards the implementation of the country's wide programme of capital investment in chemicals. All aspects of the Yugoslavian chemical industry will be represented. The first national congress for pure and applied chemistry will be held during the exhibition, as will several international chemistry symposia and a showing of chemistry films.

Pakistan Buying Fertilisers

A commercial delegation from Pakistan paid visits in April to Anic, Edison, Montecatini and other Italian companies mainly in order to negotiate the purchase of 7,500,000 Pakistani rupees worth of chemical fertilisers and pesticides for agriculture. The delegation will probably pay visits also to Germany and Holland.

Norton Develop Process for Synthetic Diamonds

Makers of abrasive and grinding wheels, the Norton Co., U.S., have announced successful fabrication of synthetic diamonds. According to reports, the process involves a patent application, and is of the high-pressure temperature-type. No details are available as to whether the Norton process embodies catalytic action, as does the U.S. General Electric system announced last year. It is stated that no commercial production is at present envisaged by Norton.

Monsanto to Expand Plasticisers Manufacture

Monsanto Canada Ltd. have plans for expansion of capacity for manufacture of plasticisers at the company's plant in Lasalle, Quebec.

Production will be increased to £12 million a year. This is the fourth expansion project undertaken by Monsanto within the last few months. These include Canada's first maleic anhydride plant; and expansions of the polystyrene and resins plants.

Glaxo's New Factory Operates in Malaya

Glaxo's new £115,000 factory in Petaling, Jaya, Malaya, is now in operation. The plant is designed to cater for the entire pharmaceutical and infant-food need of the population of the Federation and Singapore.

Dimethylterephthalate Plant for West Germany

Chemische Werke Witten GmbH, Witten, West Germany, a fully owned subsidiary of Dynamit Nobel AG, are erecting a new large-scale plant for the output of dimethylterephthalate. Present production is insufficient to meet the growing demand from the synthetic fibre industry for this material.

Sicedison, with Plants at Full Capacity, Announce New Expansion Plans

EXPANSION plans of the Società Edison Group, Milan, were announced recently, when it was stated that all the plants of Sicedison, who control the Group's chemical activities, on stream in the beginning of 1959 continued working to full capacity throughout the year.

The Italian Società Edison group now has at its disposal the following chemical capacities: 1,500,000 tonnes/year of synthetic fertilisers; 100,000 tonnes/year of polyvinyl plastics; 40,000 tonnes of acetic acid; 100,000 tonnes of caustic soda; 110,000 tonnes of carbide and ferrous compounds; 10,000 tonnes of fluorine derivatives; 75,000 tonnes of ethylene and polystyrene; 25,000 tonnes of polythene and derivatives; and amounts of synthetic fibres. These capacities include those of subsidiaries. In the past ten years the Edison group has invested some Lire 500,000 million.

New developments are the building of new installations for the cumene phenol, acetone, monomer caprolactam, chlorfluoro-hydrocarbons and cyanide compounds by the Sicedison concern at Mantua and Marghera and the expansion of Leacril synthetic fibres by the ACSA company at Marghera to a 1960 annual capacity of 6,000 tonnes.

During 1959 a new plant went on stream at Porto Marghera for the production of hydrocyanic acid and the increased output has allowed expansion of acrylonitrile production.

Sincat, another member of the Group, are now operating an ammonia plant at Priolo (near Siracuse, Socily) feeding a considerable production of fertilisers which will cover fully the requirements of Sicily and Southern Italy and considerable exports to the rest of the Mediterranean area.

During 1959, Sincat started operating a plant for the production of chlorine-caustic soda and another plant for the production of perchloroethylene while the construction of their petrochemical plants have reached an advanced stage. These latter plants will produce mainly ethylene and propylene, which will be utilised by the affiliated Celene, for the production of polythene, ethylene oxide, ethylene glycol, ethanolamine, propylene oxide and other derivatives, and alcohols for various uses.

Celene are continuing the construction of a plant at Priolo, near Sincat's plant, for the production of polythene. First part of this plant is nearly ready; the second stage (which will increase capacity to 25,000 tons) will also be ready shortly, and provision has been made for expansion to 35,000 tons, if necessary.

PEOPLE in the news

● **Mr. John C. Hardman** has been appointed assistant sales manager of Chemstrand Ltd. and for the time being will operate from 222 Royal Exchange, Manchester. He joined the company in 1958 as area sales representative for Scotland, moving from there to Lancashire and the Midlands.

● **Sir Alexander Todd, F.R.S.,** professor of organic chemistry, Cambridge University, was installed as president of the Chemical Society at the annual meeting in Queen's University, Belfast, on 7 April by his predecessor **Professor H. J. Emeléus,** professor of inorganic chemistry at Cambridge. Chairman of the Advisory Council on Scientific Policy, Sir Alexander was awarded the Nobel Prize for Chemistry in 1957.

● **Dr. B. C. L. Weedon,** reader in organic chemistry at the Imperial College, has been appointed to the London University chair of organic chemistry tenable at Queen Mary College.

● **Mr. R. D. Pullman** has been appointed building and engineering buyer for Boots Pure Drug Co. Ltd. He succeeds **Mr. C. H. Tomlinson,** who has retired after 47 years' service with the company.

● **Mr. N. G. Basset Smith,** Dunlop Rubber Co. Ltd., has been elected chairman of the British Rubber and Resin Adhesive Manufacturers' Association for 1960/61. Vice-chairman is **Dr. H. Simon,** Evode Ltd.

● **Mr. J. H. Givens,** a leading worker in the development of man-made cellulosic fibres who has been on the research staff of Courtaulds Ltd. since 1922, has now been appointed a director of the company. Until recently he was head of the Viscose Research Laboratory and his directorship is in the Viscose Division. Two further directors just named by Courtaulds are **Mr. J. G. Smith,** chief of sales, Courtaulds and Celanese yarns and fibres, and **Mr. M. R. Parker,** chief purchasing officer, Courtaulds Ltd.

● **Mr. P. Wilson** has resigned his directorship of Athole G. Allen (London) Ltd., and the British Anhydrous Ammonia Co. Ltd. after 36 years' continuous service.

● **Mr. J. L. S. Steel** has been appointed a director of the Charterhouse Investment Trust. He was formerly economic planning director, I.C.I.

● The following were elected as officers and executive committees of the British Disinfectant Manufacturers' Association for 1960. Chairman: **Mr. S. L. Waide,** Newton Chambers and Co. Ltd.; vice-chairman: **Mr. J. K. Wilson,** Cooper McDougall and Robertson Ltd.; hon. treasurer: **Mr. V. G. Gibbs,** William Pearson Ltd. Secretary is **Mr. W. A. Williams, M.B.E.,** B.D.M.A., Cecil Chambers, 86 Strand, London W.C.2.

● **Mr. A. Glyn Owen** has been appointed sales manager for Styrocell expanded polystyrene by the Plastics Division, the Shell Chemical Co. He will also be responsible for new markets and applications.

On the occasion of the presentation of long-service awards to staff members, the chairman of Evans Medical Ltd., Mr. I. V. L. Ferguson, received a gold watch on completion of 40 years' service. It is being presented by Dr. F. S. Gorrill, deputy managing director

● **Mr. James Jones** will retire from his duties as executive chairman of Laporte Acids Ltd., the Sheffield Chemical Co. Ltd., James Watkinson and Son Ltd., and Glebe Mines Ltd., as from 14 July. He will continue to hold the office of a director of Laporte Industries Ltd. Mr. Jones' knowledge and experience of the Yorkshire acid trade are extensive. He joined John Nicholson and Sons Ltd. in 1918 and became joint managing director of that company when it joined the Laporte Group, being appointed chairman of Laporte Acids in 1955.

● **Dr. A. F. Trotman-Dickenson** has been appointed to the Chair of Chemistry at the University College of Wales, Aberystwyth, as from 1 October. He is at present lecturer in chemistry at Edinburgh University.

● **Sir Neville Gass** is relinquishing his appointment as chairman of British Petroleum Co. on 30 June. He is to be succeeded by **Mr. M. R. Bridgeman;** and **Mr. J. M. Pattinson** will become a deputy chairman. It is intended to appoint **Mr. M. A. L. Banks** to fill the further vacancy caused by the retirement of Sir Neville.

● **Mr. C. B. Bolland,** at present a deputy chairman of Laporte Acids and a director of the Sheffield Chemical Co. Ltd. and James Wilkinson and Son Ltd., will assume the chairmanship of those companies upon Mr. Jones' retirement, and also of Glebe Mines Ltd.

● **Mr. John J. Sosa** has been appointed assistant works manager for operations at the Acrilan acrylic fibre plant at Coleraine, Northern Ireland. He joined Chemstrand Corporation, U.S., in 1955, and was intermediates superintendent at the Corporation's Acrilan plant at Decatur, Alabama.

DIARY DATES

WEDNESDAY 20 APRIL

Plastics Inst.—Stroud: Technical College, 7 p.m. 'Thermosets: new materials, new methods, new problems' by J. Butler.

S.C.I.—London: Hoare Memorial Hall, Church Hse., S.W.1., 10 a.m. Two-day symposium on 'Chemical analysis of soils, fertilisers and plants'.

S.C.I.—London: 14 Belgrave Sq., S.W.1., 6.30 p.m. Chemical engineering group a.g.m., and 'Developments in factory floorings', by S. C. Chigison.

Soc. Instrument Tech.—Newcastle on Tyne: Conference Room, Roadway Hse., Oxford St., 7 p.m. 'Gas calorimetry', by A. D. E. Lauchlan.

THURSDAY 21 APRIL

S.A.C. with Fertiliser Soc.—London: Church Hse., Westminster, S.W.1., 2.30 p.m. Two-day symposium on 'Fertiliser analysis'.

S.C.I.—Liverpool: Donnan Laboratories, University, Grove St., 5.45 p.m. Liverpool section a.g.m., and Jubilee Memorial Lecture: 'Modern industrial ceramics', by C. N. Hodson.

S.C.I.—London: 14 Belgrave Sq., S.W.1., 6 p.m. Corrosion group a.g.m., and 'Electrode processes in primary batteries', by D. H. Collins.

FRIDAY 22 APRIL

C.S.—St. Andrews: Chemistry Dept., St. Salvators College, 5.15 p.m. 'Are scientists literate?' by J. Maddox.

S.C.I. with R.I.C.—Newport: King's Head Hotel, 7 p.m. Scientific film show.

S.C.I.—London: 14 Belgrave Sq., S.W.1., 10 a.m. Education panel a.g.m., followed by conference on 'Teaching corrosion science to engineers'.

Soc. For Visiting Scientists.—London: 5, Old Burlington St., W.1., 7.30 p.m. Discussion meeting on 'Unconventional forms of energy'.

TRADE NOTES

Hypalon Prices Cut

Hypalon synthetic rubber price has been reduced by Du Pont Co. (U.K.) Ltd., 76 Jermyn Street, London S.W.1. All three types available in the U.K. are affected. New prices are Hypalon 20, 4s per lb.; Hypalon 30, 5s. ¼d./lb.; Hypalon 40, 4s 2¼d/lb. These are all delivered prices; previously the price of all three types was 5s. 11¼d./lb. Hypalon is made by reacting polythene with chlorine and sulphur to produce a vulcanisable rubber with many unusual properties.

New Trade Name

The trade name Fulmont is to be applied by the Fullers' Earth Ltd. to all their standard grades of activated fullers' earth. The particular grade designations will follow the name.

Algae Control

Effective industrial control of algae is explained in a new leaflet issued by the British Drug Houses Ltd., Poole, Dorset.

I.C.I. Titanium Alloys

The Metals Division of I.C.I. have now produced a 60-page brochure on art paper, containing largely in graph form information on the subject of titanium and its physical and mechanical properties. The work is in two parts; the second, under the general heading 'I.C.I. Titanium Alloys', deals with titanium 314C and A; 317; 318A; 230 and 679. A further, illustrated publication, describes the various methods of titanium fabrication. Copies are available from the company.

Novo Enzymes

A booklet giving information, illustrated by graphs, on the activity and stability of many types of enzymes under various pH values and temperatures, together with recognised methods of enzyme evaluations, is now available. It has been produced by Globe Products Ltd., Accrington, Lancs, in conjunction with their associates Novo Industri A/S, Copenhagen.

Change of Address

London offices of Uddeholm Ltd. are now located at 124 Victoria Street, S.W.1. Telephone Victoria 6780 and 5711. The head office remains at Crown Works, Northwood Street, Birmingham 3.

(*Continued from Col. 3*)

over the complete range. The agricultural trade, of course, is extremely busy at the moment in all spheres due to the seasonal demand and, generally speaking, prices are steady, although copper salts are showing a tendency to firmness, probably due to the unrest abroad. A moderate volume of tonnage has been shipped against export demands, and on the whole a fair summary of the past week would be that trade all round has been satisfactory.

Market Reports

LONDON General background to the market has not materially changed and flow of new inquiry on home and export account has been satisfactory. While movement of supplies has been good, some contraction in deliveries has been reported on the week, but no more than is usual prior to Easter. Owing to the dearer metal, revised bases prices are announced for some of the lead compounds. Dry white lead is £2 a ton dearer at £122, while red lead and litharge have each advanced by £2 5s a ton. These increases date from 6 April.

Demand for fertilisers has continued at a high level with available supplies readily taken. Coal tar products continue in firm demand and there is no easing in the call for naphthalene. Carbolic acid is currently quoted at ¼d per lb., bulk delivered for minimum 10-ton lots.

MANCHESTER Apart from indications of pre-holiday quietness, reasonably steady trade is reported in most sections of the Manchester market. Movement of supplies under contract to the textiles and allied trades has been satisfactory, with a fair amount of spot business.

SCOTLAND The volume of business passed in general chemicals in the Scottish heavy chemical market was greatly accelerated with the demand well spread

(*Continued in previous column*)

Commercial News

Associated Chemical Cos.

Group trading profit of the Associated Chemical Companies Ltd. for 1959 was, according to a preliminary statement, £1,266,675 (£1,156,536). Depreciation accounted for £388,468 (£320,299). Profit before tax was £876,037 (£906,490). Tax took £355,166 (£425,060), leaving a profit for the year of £520,871 (£481.430). A final dividend of 8½%, making 15% is to be paid on Ordinary.

Wm. Butler and Co.

Net profit for 1959 of Wm. Butler and Co. (Bristol) Ltd., after tax is £108,771, compared with £22,201, with a final dividend of 8%, making a total of 10%.

Simon Group

Final dividends of 25%, making 35%, have been recommended by the directors of Simon-Carves Ltd. and Henry Simon (Holdings) Ltd., in anticipation of the proposed merger of the group. They represent the first stage in the implementation of that policy. Group profit of Simon-Carves was £1,607,202 (£1,461,814) the net balance attributable to the company being £826,357 (£686,301). Henry Simon's group profit was £1,274,935 (£1,206,321), the net balance attributable to the company being £666,987 (£571,999).

Esso Petroleum

Net profit of the Esso Petroleum Co. rose from £7.33 million to £10.35 million in 1959, and group sales and other revenue expanded from £259.63 million to £292.05 million.

Capital expenditure during the year totalled £27,946,000 (£32,225,000) and it is stated that substantial expenditure will be directed to maintaining and improving efficiency of operations and quality of products.

Pipelines' plans from Fawley to London and Severnside are well advanced, and the company have on order or under construction eight ocean-going tankers. An outstanding feature was progress made in construction of the Milford Haven refinery, already 60% complete by last Christmas.

Rio Tinto

Group net income of the Rio Tinto Co. for 1959 was £3,914,000 (£3,157,000). Net profit, excluding the Canadian company and its subsidiaries, was £2,829,000 (£2,004,000). Dividend is maintained at 20%.

L'Air Liquide

L'Air Liquide of France plan to increase share capital from the present level of New Fr.81,250,000 to New Fr.300 million.

Bayer

The board of Farbenfabriken Bayer AG, Leverkusen, is recommending payment of a 16% (14%) dividend for 1959 on a share total of DM660 million, or some £55 million. The raising of the company's authorised capital by a further DM65 million is also proposed.

Societa Edison

Annual report of the Italian chemical producers, Società Edison of Milan, shows a net profit of Lire 13,680 million (Lire 12,350 million) after depreciation of Lire 4,700 million (Lire 4,750 million) for 1959. Dividend is declared at 6¼% (6½%). Turnover was valued at Lire 39,020 million (Lire 34.800 million), with turnover of subsidiaries at Lire 12,060 million (Lire 10,090 million).

Sandoz AG

Sandoz AG, Basle, Switzerland, had a world turnover—96% from other-than-Swiss sales—of Sfr.572 million last year against Sfr.503 million in 1958. The turnover was made up Sfr.211 (184) million for dyestuffs; Sfr.238 (213) million, pharmaceuticals; and Sfr.123 (106) million, chemicals. Net profit was Sfr.17,361,024 (Sfr.16,754,719). A dividend is to be declared for old shares of Sfr.100 (same) per share and for the new shares, issued last October, of Sfr.25. Building on the Horsforth, near Bradford, site of Sandoz Products Ltd. progresses according to plan and modernisation is being carried out at the Manchester plant of Clayton Aniline Co. Ltd., of which Sandoz owns 25%. A subsidiary has been established in New Zealand under the name of Sandoz Pharma Ltd.

Ciba AG

Further details of last year's activities of Ciba AG, of Basle (see C.A., 2 April), as drawn from the company's annual report issued last week show turnover rise of 12% to Sfr.1,026 million (about £85,500,000) in 1959. This was due particularly to an increased demand for dyestuffs and increased sales of pharmaceuticals, textile auxiliaries and pesticides. Demand for products made by the British subsidiary of Ciba rose well, while the turnover of two French subsidiaries fell as part of a general slackening of Ciba trade in France. Quantities of niobium and new special qualities of tantalum were produced for the first time, as were new dyes and textile chemicals. Research costs totalled Sfr.31,610,078. Dividend of Sfr.25 statutory dividend and a further Sfr.65 are proposed.

F. W. Berk

F. W. Berk and Co. Ltd. state that underwriting is in progress of an issue of 1,680,000 Ordinary shares of 5s each at 11s 6d a share. 1,656,000 of the new shares will be offered in the proportion of three-for-10. Ordinary shareholders will also be invited to apply for the balance of 24,000 new shares, for any shares not taken up under provisional allotments and for those shares representing fractions.

Hooker Chemical Corp.

Net sales of the Hooker Chemical Corporation, New York City, for the three months ended 29 February, were worth $36,192,400 ($34,898,000) but net income was down to $2,991,600 ($3,198,500). Expenditure on research and development and increased costs were contributory factors.

NEW PATENTS

By permission of the Controller, HM Stationery Office, the following extracts are reproduced from the 'Official Journal (Patents)', which is available from the Patent Office (Sales Branch), 25 Southampton Buildings, Chancery Lane, London W.C.2, price 3s 6d including postage; annual subscription £8 2s.

Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.

ACCEPTANCES

Open to public inspection 18 May

Processes and compositions for imparting water-repellency. Union Chimique Belge S.A. **834 962**

2-methyl-1,- 4-pregnadienes. American Cyanamid Co. **835 514**

Preparation of 9-hydroxy-4-pregnenes. American Cyanamid Co. **835 515**

Distillation apparatus. Beech, S. G. **834 967**

5-*o*-Alkoxyphenoxy-methyl-2-oxyolidones. Robins Co. Inc., A. H. **834 968**

Thiophosphoric acid esters. Farbenfabriken Bayer AG. [Addition to 834 331.] **835 186**

Acid hydrazides and a process for the manufacture of same. Hoffmann- La Roche & Co. AG., F. **834 981**

Optically active aryl-(2-pyridyl) aryl- substituted tertiary amines. Scherico Ltd. **834 984**

Masticating agents for rubber. Farbenfabriken Bayer AG. **835 391**

Orally-effective antidiabetic compounds. Boehringer & Soehne GmbH., C. F. **835 390**

Separation of carbon black particles from gas containing them. Bataafsche Petroleum Maatschappij N.V., De. **834 989**

Catalytically hydrogenating benzene. Stamicarbon N.V. **835 394**

Dihydroxy polyaromatic ethers. General Electric Co. [Divided out of 835 464.] **835 465**

Open to public inspection 25 May

Uranium recovery. Honorary Advisory Council for Scientific & Industrial Research. **835 690**

Gas-making plant. Humphreys & Glasgow Ltd. **835 695**

Production of oil gels and the like. Hardman & Holden Ltd. **835 874**

Preparations for control of plant pests. Farbwerke Hoechst Aktiengesellschaft Vorm. Meister, Lucius, & Brüning. **835 546**

Method of producing perpolyphosphates or salt mixtures containing same. Benckiser GmbH, Chemische J.A. **835 877**

Manufacture of phenol-aldehyde resins, condensation resins derived solely from furfuryl alcohol and condensation resins of furfural with another aldehyde. Farbwerke Hoechst Aktiengesellschaft Vorm. Meister, Lucius, & Brüning. **835 548**

Quaternary ammonium copolymers and methods of producing them. Rohm & Haas Co. **835 550**

Process for aromatic polycarboxylic acids. Mid-Century Corporation. [Addition to 807 091.] **835 733**

Process for titanium dioxide. Laporte Titanium Ltd. **835 889**

Salts of -hydroxy-1:2:5:6-tetrahydrobenzyl-phosphorous acid and a process for manufacture. Farbwerke Hoechst Aktiengesellschaft Vorm. Meister, Lucius, & Brüning. **835 737**

Corrosion preventive composition based on a modified phenol-formaldehyde resin. Gulf Oil Corporation. **835 883**

Continuous formation of controlled mol wt. acrylonitrile copolymers. American Cyanamid Co. **835 552**

Colloidal powders and method of producing same. Activa Ibera S.A. **835 738**

Preparation of alkyl aluminium compounds and alkyl aluminium hydrides. Ethyl Corporation. **835 555**

Steroid compounds and preparation. American Cyanamid Co. **835 557**

Decarboxylic acid esters and amides and process. Ciba Ltd. **835 891**

Manufacture of diaryloxazole derivatives. Ciba Ltd. **835 892**

Acylamino-compounds and process. Ciba Ltd. **835 893**

Manufacture of di-(aryloxazolyl)-ethylene derivatives. Ciba Ltd. **835 894**

Process for α: β-di-[aryloxazolyl-(2)]-ethylene compounds. Ciba Ltd. **835 895, 835 897**

Aryloxazolyl-ethylene derivatives and process. Ciba Ltd. **835 896**

α: β-di-[benzoxazolyl-(2)]-ethylenes. Ciba Ltd. **835 898**

Antibiotic angolamycin and its preparation by fermentation, hydrogenation and fission products thereof and salts of these compounds. Ciba Ltd. **835 886**

Process for linear polyesters of high mol wt. Farbwerke Hoechst Aktiengesellschaft Vorm. Meister Lucius, & Brüning. **835 743**

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